



**COCKPIT RULES**  
**WOULD TWO-CREW**  
**MANDATE MAKE A**  
**DIFFERENCE?**  
**NEWS FOCUS P12**

**FALLING SHORT**  
Investigators probe what  
caused Air Canada A320  
crew to strike terrain in  
Halifax mishap **14**

**SPENDING CHOP**  
US Army faces more  
tough choices as budget  
fails to match helicopter  
project ambitions **18**

# FLIGHT

## INTERNATIONAL

From  Flightglobal

7-13 APRIL 2015

**BRAZIL SPECIAL**

## LIFTING AN INDUSTRY

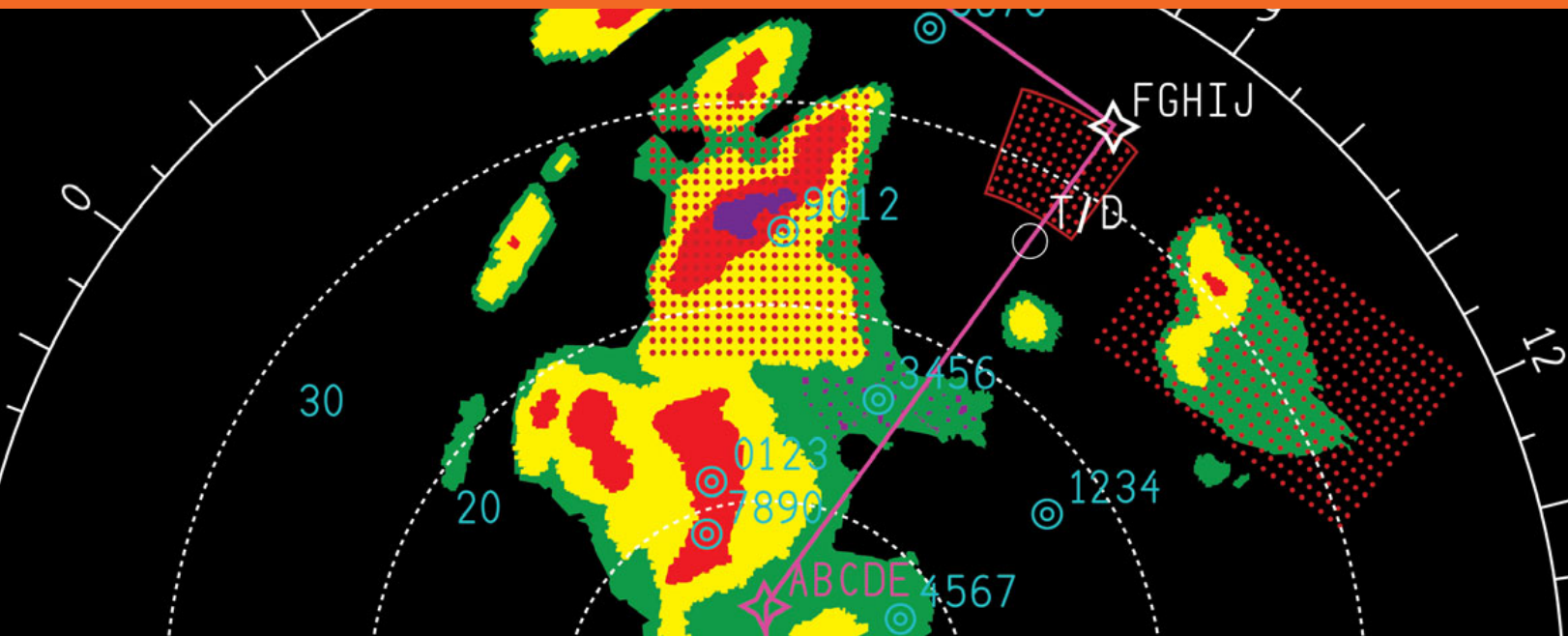
Why KC-390 is not the only type  
carrying nation's aerospace hopes



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# COVER IMAGE

Brazil's domestic industry is making rapid advances in aerospace, as illustrated by this image of Embraer's KC-390, taken during its 3 February flight debut **P26**



# BEHIND THE HEADLINES

Stephen Trimble (above) headed to Nashville for the annual Army Aviation Association of America – or Quad A – convention (P18). Elsewhere, Michael Gubisch was in Amsterdam for an update on KLM's passenger and freight strategy (P14)



# NEXT WEEK MRO SPECIAL

We look at the prospects for North America's MRO market. Plus, our assessment of the A330neo versus 787 rivalry

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More powerful Black Hawks on US Army's shopping list **P18**. A320 struck terrain at end of Halifax runway **P14**



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## IMAGE OF THE WEEK

A squad of US Air Force pararescue jumpers and combat rescue officers exit a US Marine Corps MV-22B Osprey tiltrotor during a joint combat search and rescue training exercise in Perry, Georgia. Flightglobal's Ascend Fleets database records 273 Ospreys as being in current active service

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US Air National Guard

## THE WEEK IN NUMBERS

**313%**

Flightglobal dashboard

The increase in operating profit at China Southern, where net profit fell 10% on rising interest costs and other losses

**\$529m**

Raytheon

Total value of a USAF fixed-price contract for Raytheon to provide AMRAAM Lot 29 missiles, including for foreign sale

**15**

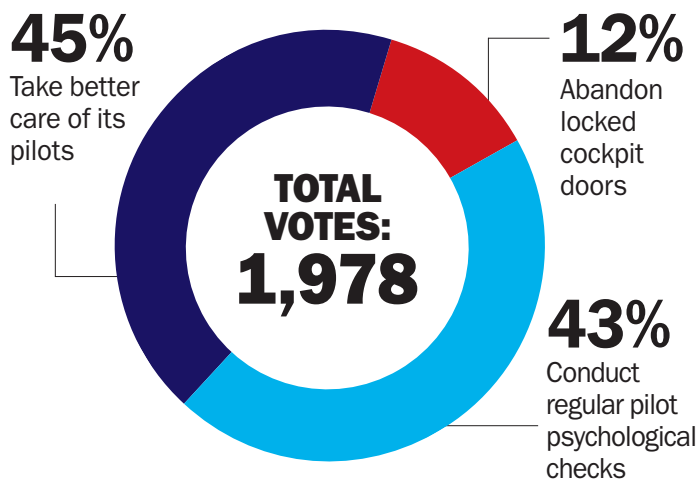
Flightglobal dashboard

Number of for-lease A320s sold off by Kuwait's Jazeera Group – pushing it to a 2014 loss of KD2.9m (\$9.6m)

## QUESTION OF THE WEEK

Last week, we asked:

After the Germanwings loss the industry should...? You said:



This week, we ask: **As the US Army struggles to fund helicopter projects, it should**

- ☐ Get more money from Congress  
☐ Prioritise current upgrades ☐ Concentrate on future needs  
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- ▶ **274** DELEGATIONS FROM 76 COUNTRIES & REGIONS
- ▶ **CLOSE TO 70** CEOs, PRESIDENTS AND CHAIRMEN FROM VARIOUS AIRLINES AND INDUSTRY ASSOCIATIONS
- ▶ **1,132** HIGH-LEVEL MEETINGS TOOK PLACE BETWEEN VIP DELEGATIONS AND EXHIBITORS

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# In need of a lift

Reality is sinking in at the US Army's cash-constrained aviation branch, which has created a wish list that it simply cannot afford. But where can it accept a downgrade in ambition?

**H**elicopter manufacturers, here is your challenge: build a machine that can pick up a critically wounded soldier at the top of a 6,000ft mountain on a hot day in July, dash at 220kt or faster to a medical facility hundreds of kilometres away, then land the vehicle easily in a blinding sandstorm while an onboard countermeasure system thwarts an incoming, state-of-the-art surface-to-air missile. And bonus points if you can make it do all those things without a pilot on board.

As you let that technological challenge sink in, you should be aware of a couple of small details. The world's largest helicopter operator may not be completely sold on the challenge, and the customer probably does not have the money to pay for it. This is the US Army and its Future Vertical Lift (FVL) programme.

This may be the most technologically ambitious rotorcraft project ever to migrate from a laboratory curiosity into an approved acquisition effort. Two industry

## The army also must somehow sustain the three current workhorses of its combat fleet

teams will begin building demonstrator aircraft in two years. A new engine design to support the project is already on the drawing board, and the date for starting low-rate initial production has been set.

Despite all of those positives, a sense of hopelessness hangs over the effort. And it is not just because all of the army's clean-sheet development projects for new combat helicopters have ended in disaster since the early 1980s (excluding the Airbus Helicopters LUH-72A Lakota, but that was a commercially-based design with no development required).



Were you expecting something a bit faster?

The army's resources are being stretched by the downturn in spending after the wars in Afghanistan and Iraq. As the supply of overseas contingency funding has shrivelled, the procurement budget of the army's aviation branch has plummeted by 40% in less than three years. But its wish list of procurement priorities has only expanded. As future combat is more likely to involve urban canyons in megacities than open deserts or remote mountain hideouts, it feels compelled to seek better survivability systems and more advanced sensors.

Even if a series of FVL aircraft designs moves into production, the army must also somehow sustain the three current workhorses of its combat fleet – Boeing's AH-64 Apache and CH-47 Chinook, and the Sikorsky UH-60 – until beyond 2060. Within about 10-15 years, planned engine upgrades for the UH-60 might allow a Black Hawk to pluck the wounded soldier off the mountain. It will not go as fast or as far as a notional FVL, but perhaps that will have to be good enough. ■

See This Week P9, Defence P18

## Information anarchy

**I**ntense media interest in an accident like the Germanwings crash in the French Alps is understandable – but the way the media and public has been fed with information directly from a grandstanding French judicial prosecutor is not.

The prosecutor's public statement within 48h of the incident that he was satisfied that the co-pilot had crashed the aircraft deliberately was made even more legally surreal by the fact that the "guilty" party was beyond prosecution by reason of death.

Now the media marketplace has been so flooded with "information" and speculation that, for a member of the public seriously looking for reliable facts from expert or official sources, it is difficult to tell

what is real and what is not. The effect has been to put intolerable pressure on the excellent French accident investigator – the BEA – to provide data to back up not only what the media actually know, but also what they think they know.

And all this is happening when the investigators should be left to get on with their job of painstakingly sifting and testing the real evidence at their disposal. Left alone to do so, the BEA would – fairly quickly – have provided a statement of established facts, enabling intelligent interpretation by the public and media, and avoiding information anarchy that also compromises the judicial system. ■

See This Week P9, News Focus P12



To access more of our coverage about the US Army's ambitious rotorcraft plans, go online at [flightglobal.com/defence](http://flightglobal.com/defence)



# BRIEFING

## EASA APPROVES HIGHER-WEIGHT A330-300

**DEVELOPMENT** Airbus has secured European Aviation Safety Agency certification and expects US Federal Aviation Administration sign-off "soon" for the higher-weight version of its General Electric CF6-powered A330-300 – the 242t variant on which the re-engined A330neo will be based. Eleven customers have opted for the higher-weight version, which offers a 500nm (925km) increase in range.

## SOLAR IMPULSE 2 CELEBRATING IN CHINA

**ENDURANCE** The no-fuel aircraft Solar Impulse 2 completed the fifth and so far longest-duration leg in its round the world flight, arriving in Chongqing on 30 March after a 20h 29min trip from Mandalay. Landing was described as "challenging and delayed" owing to strong winds and heavy traffic. Departure is imminent for Nanjing, followed by a Pacific Ocean crossing with a stop in Hawaii.

## UK SIGNS NEW MERLIN SUPPORT DEAL

**HELICOPTERS** AgustaWestland has received a contract worth £580 million (\$860 million) to support the UK's fleet of AW101 Merlin rotorcraft until March 2020. Meanwhile, the Royal Navy's 846 Naval Air Squadron has returned to its home base at RNAS Yeovilton in Somerset equipped with six Merlin HC3/3As previously operated by the Royal Air Force. These are to be upgraded for use by the navy's Commando Helicopter Force, replacing the Westland Sea King HC4.

## SPACE STATION IS HOME FOR THE LONG HAUL

**FLIGHT MEDICINE** American Scott Kelly and Russian Mikhail Kornienko have begun an unprecedented one-year stay on the International Space Station – a normal mission last six months. Interpretation of biological and genetic data will be greatly enhanced by the unusual opportunity for ongoing study of Kelly's twin brother Mark – also a NASA astronaut – who will remain on the ground.

## 328 DESIGN SECURES APPROVAL FROM UAE

**DESIGN** 328 Design (328D0) has received supplemental design organisation approval from the General Civil Aviation Authority of the United Arab Emirates, allowing the Oberpfaffenhofen-based company to perform modifications on UAE A6-registered aircraft. 328D0 manages 200 supplemental type certificates for a range of aircraft.

## DUTCH BID FOR F-MODEL CHINOOKS

**REQUEST** The US State Department has approved an estimated \$1 billion request from the Netherlands covering the acquisition of 17 Boeing CH-47F Chinook transport helicopters. The aircraft would "supplement and eventually replace" 11 D-model aircraft – which Flightglobal's Ascend Fleets database records as having an average age of 32 years – and six newer CH-47Fs already in Dutch service.

## NEW ZEALAND RECEIVES FINAL T-6C TRAINERS

**DELIVERIES** New Zealand's final pair of Beechcraft T-6C trainers have been delivered to the nation, completing an 11-strong order placed in January 2014. Registered as NZ1410 and NZ1411, the aircraft departed the US manufacturer's Wichita assembly site in Kansas on 27 March at the start of their long-distance delivery.

## MORETTI TO HEAD EUROPEAN AEROSPACE GROUP

**INDUSTRY** Finmeccanica chief executive Mauro Moretti has been appointed president of the AeroSpace and Defence Industries Association of Europe, succeeding Safran's Jean-Paul Herteman.



The airline plans to carry more cargo in the belly of 777-300ERs

**STRATEGY** MAVIS TOH TAIPEI

# Eva switches over to widebody focus

Taiwanese carrier abandons its plans to order more than 30 narrowbody aircraft and considers A350-900 or 787-10

Taiwanese carrier Eva Air has dropped its plans to induct new generation narrowbody aircraft, and will instead focus on securing a deal this year for new widebody passenger aircraft and freighters.

Speaking to Flightglobal in Taiwan, Glenn Chai, executive vice president of the carrier's corporate planning division, says it will choose between the Airbus A350-900 and Boeing 787-10 for its medium to long-haul needs. The carrier had also looked at the A330neo, but says the performance of the A350-900 since its entry into service with Qatar Airways has swayed it toward considering the type.

Chai says Eva has not decided on how many widebody passenger aircraft it will order, but indicates it should require more than 16 units. These should be delivered around 2019, he adds.

Explaining the decision to not pursue a narrowbody order, he says the airline is focusing on building its transit traffic from Canada and North America to Southeast Asia: a mission that can only be filled by widebodies.

"We have a lot of transit passengers," says Chai. "The narrowbody cost base is good, but the bulk is too small. Right now

we will maintain at 24 A321s. We feel that this is enough. Thereafter we have no plans for more narrowbodies."

Last November, Eva said it was planning to make an order for at least 30 narrowbody aircraft during 2015, and was deciding between the A320neo and 737 Max.

Chai also reveals that the carrier is in negotiations for the 777F, to replace the eight 747Fs in its current fleet. The airline expects to order a smaller number of the newer type, he says, as it foresees carrying more cargo in the belly space of its 777-300ERs.

"For freighters we're quite careful. We won't be making bulk orders. We hope the 777Fs will come in by 2017, and we'll start retiring the 747Fs before that," he says, adding that the target is to place an order later in 2015.

Flightglobal's Ascend Fleets database shows that Eva has a fleet of 62 aircraft in service, comprising A321s, A330s, 747s and 777-300ERs. It also has orders for a combined 16 additional aircraft.

The company also plans to merge its mainline carrier and regional subsidiary Uni Air into a single brand, although this is contingent on the Taiwanese government changing how it allocates traffic rights. ■





Operators sign up  
with Heli Offshore  
**THIS WEEK P10**

**ROTORCRAFT** STEPHEN TRIMBLE NASHVILLE

# Sikorsky sets bar high for Raider test

Compound-coaxial S-97 expected to demonstrate a 3g turn at maximum speed and show new levels of hover efficiency

**S**ikorsky officials have outlined the scope and duration of the upcoming flight test programme for the S-97 Raider high-speed, compound helicopter, identifying three key performance parameters for the demonstrator to achieve over a roughly 18-month period.

The flight test programme is yet to start, but will seek to achieve a manoeuvrability record for a rotorcraft: a 3g turn at a maximum speed of 220kt (407km/h), says Chris Van Buiten, Sikorsky's vice-president of engineering. "That's something a helicopter has never done," he says.

A second goal is to achieve the same speed while carrying a full weapons load, and the S-97 will also attempt to demonstrate a new level of hover efficiency for a rotary-wing aircraft.

Sikorsky wants to show that the Raider can hover with a full weapons load at a 6,000ft elevation and in temperatures of 35°C (95°F), Van Buiten says. With a



**Flight tests are yet to start, but the aircraft may set new records**

reduced load, it should be able to hover at 10,000ft at the same temperature level, he adds.

The company first demonstrated the compound-coaxial, rigid-rotor configuration with its X2 prototype, which flew 23 test flights. The number of sorties for the S-97 will be slightly higher in order to demonstrate the full envelope for the aircraft, a second example of which entered final assembly in early March.

What happens after Sikorsky completes the S-97 demonstration is unclear. The aircraft is too

small to compete for the US Army's Future Vertical Lift (FVL) requirement. The service is also eliminating its armed aerial scout fleet as part of a broader restructuring, although officials say the requirement for such a helicopter remains.

"Our job is to demonstrate a super-compelling option and show that it's possible to have FVL-level technology much sooner than you thought," Van Buiten says.

"Raider serves as a great risk reduction for that technology."

The company has teamed up with Boeing to develop the coaxial-compound, rigid-rotor SB-1 for the army's joint multi-role technology demonstration (JMR-TD) programme.

Meanwhile, Bell Helicopter and Lockheed Martin unveiled a single-screen glass cockpit concept in a V-280 tiltrotor mock-up displayed at the Army Aviation Association of America's annual conference in Nashville, Tennessee on 30 March. This is a step on from the flight deck designed as part of the JMR-TD process, which will contain four conventional multi-function displays.

Lockheed is proposing several technologies originally developed for the F-35 Joint Strike Fighter for FVL, including its distributed aperture system and electro-optical targeting system.

The JMR-TD will help the army shape its requirements for a FVL family that will not be operational for nearly two decades. ■

**See Defence P18**

**INVESTIGATION** DAVID LEARMOUNT LONDON

# BEA battles leaks to establish facts of A320 crash

**F**ollowing leaks reported from the 24 March Germanwings Airbus A320 accident investigation in the general media, France's BEA agency is attempting to "describe more precisely, from the technical perspective, the history of the flight".

In a 31 March announcement, the BEA says: "This work will be based on detailed analysis of data from the cockpit voice recorder as well as analysis of any flight parameter data that may be available." As *Flight International* went to press, the flight data recorder had still not been recovered from the crash site in the French Alps.

The BEA says it is "studying the systemic weaknesses that might possibly have led to this aviation disaster or other similar

events. Within this context, the safety investigation will be oriented towards the cockpit door locking system logic and cockpit access and exit procedures, as well as the criteria and procedures applied to detect specific psychological profiles."

This is a reference to the belief, voiced by the French judicial prosecutor, that the co-pilot, alone in the cockpit, deliberately engineered the crash.

The Düsseldorf public prosecutor's office has disclosed that the first officer had been treated for

suicidal tendencies over an "extended period" before he had obtained his flight qualifications. He had undertaken more recent visits to medical specialists in neurology and psychiatry, in association with periods of sick leave, but there is no recorded evidence of aggression or suicidal behaviour.

Lufthansa confirms that the co-pilot held an up-to-date Class 1 medical certificate.

Meanwhile, the French prosecutor has reacted to reports that German newspaper *Bild* and French magazine *Paris Match* have obtained chips from passenger smartphones containing video footage of the cabin in the last seconds of the flight by saying that if they exist they must be handed in to the investigators. ■

**See News Focus P12**



**Identifying the victims of the accident has been a difficult process**


**ROTORCRAFT** DOMINIC PERRY LONDON

# Operators sign up with Heli Offshore

Safety body head shrugs off impact of falling oil prices and reports significant take-up in membership across industry

**H**eli Offshore, the new safety body covering the global offshore rotorcraft sector, believes it has made significant progress during its first six months of existence, despite downward cost pressures on its members.

Gretchen Haskins, chief executive of the London-headquartered body, says she is “delighted” by the take-up in membership. So far, 44 companies have signed up, including operators from Australia, Nigeria and Latin America, as well as major European and North American firms. All four of

the major Western airframe original equipment manufacturers are in the process of joining, as are turbine engine producers.

Haskins cites the recent publication by Airbus Helicopters of the first flight-crew operations manual (FCOM) – for the H225 – as a sign of its buy-in to Heli Offshore’s aims. “All three of the other OEMs have agreed to work with us to do the same,” she says, with other FCOMs to be completed “within 18 months”.

A health and usage monitoring systems user group has been



**Airbus Helicopters’ H225 now has a flight-crew operations manual**

meeting every two weeks to “create a set of best practice principles”, which will be presented at Heli Offshore’s first conference, in Lisbon, Portugal, next month.

“It’s a group of like-minded professionals talking about how they do their job,” Haskins says. “There are nuggets of best practice from all operators and they are really starting to learn from one another.”

Further activity centres on “operational monitoring”, which will see research commissioned to analyse where a pilot looks during a flight. Another study will examine helicopter terrain awareness warning systems, to determine how to optimise crew alerting and response times.

The offshore transportation sector is facing a difficult financial operating environment due to the low price of crude oil, but Haskins says she has yet to see any effect on safety or the new body’s work, noting: “If anything, it has galvanised us to be more focused.”

There has been turmoil, too, at one of the group’s founding members. Canada’s CHC Helicopter has seen its share price plummet from around \$10 a year ago to \$1.27, and its chief executive replaced by former GE Aviation head Karl Fessenden, who has also been voted onto the Heli Offshore board.

## COMMUNICATION

### New CHC chief sees safety benefits in talking to passengers

CHC Helicopter’s new chief executive has called for greater engagement with offshore oil and gas workers to improve the industry’s overall levels of safety.

Speaking at the company’s annual Safety and Quality summit in Vancouver on 23 March, Karl Fessenden said that too often helicopter operators’ communication with

passengers “is perceived as a checklist exercise: one-way and hollow”.

A first step, he says, is to assure the offshore workers “are not seen, and do not see themselves, as merely ‘self-loading freight’”.

“If you think that our resolve to always get passengers safely to their destination is understood by all – well, you might want to speak with

a few offshore workers, because it is not,” Fessenden says.

The quest for improved safety should be “shared”, he says, and delivered through initiatives including educating the workforce on the need for a collective safety management system, and “promoting mutual respect, trust and deference, based on experience and accountability”. ■

**PROCEDURES** ELLIS TAYLOR SINGAPORE

# Thai safety suggestions fail to fully convince ICAO

**I**CAO says it is continuing to work with Thailand’s department of civil aviation to address issues raised following a safety oversight audit conducted in January. This revealed safety concerns around the country’s procedures for approving air operator’s certificates.

“Thailand officially provided ICAO with the details of its corrective actions and mitigation measures on 2 March, and we continue to work with its civil aviation authority on resolving the issues in question,” the organisation says.



**Japanese concerns will affect Thai’s planned new charter services**

Local media reports claim that ICAO has called for faster action, after Bangkok initially presented an action plan to the organisation

that would take up to two years to complete.

As a result of the safety concerns, Japan and South Korea

have suspended applications for new scheduled and charter flights requested by Thai carriers. Thai Airways International says their actions will not have any impact on its scheduled services, but will affect charter flights it had planned to operate to Hiroshima and Komatsu in Japan in April.

NokScoot has also suspended sales on its planned Bangkok-Seoul route, which the aircraft was due to start in May, and there is some doubt over Thai AirAsia X’s planned Bangkok-Sapporo service. ■





Pilot groups raise  
data leak concerns  
**NEWS FOCUS P12**

**SPACEFLIGHT** DAN THISDELL LONDON

# Mars mission comes closer as NASA lays out NextSTEP

Commercial partners signed to develop systems, while mid-2020s asteroid study shapes up

**N**ASA has fleshed out its vision for space exploration through the mid-2030s, outlining its mid-term plan for asteroid study and selecting commercial partners to devise key technologies to enable astronauts to survive for extended periods in deep space.

Next Space Technologies for Exploration Partnerships (NextSTEP) are, initially, 12-month contracts for work on advanced propulsion, habitation and small satellite technologies. Selected companies include Aerojet Rocketdyne, Boeing, Lockheed Martin and Orbital ATK, but also small players such as Morehead State University in Kentucky.

The power of electric propulsion systems – efficient and capable for operations over long periods with minimal propellant brought from Earth – must be increased from less than 5kW today to around 40kW. Habitation systems will be needed to enable the Lockheed-built Orion capsule to sustain a crew of four for up to 60 days in orbit around the Moon,



**SLS is scheduled to fly in 2018**

and then scaled up to cope with the nine months or so needed to reach Mars. Small satellites called CubeSats are to be developed as secondary payloads for scientific and technology development purposes.

NASA's NextSTEP selections – which are also expected to “help determine the role for international partner involvement, by fully exploring domestic capabilities” – follow the disclosure of

more details about its concept for a mid-2020s asteroid redirect mission. It plans to send a robotic spacecraft to a near-Earth asteroid – to be selected no earlier than 2019 – and grab a boulder from its surface, to be pulled into a stable orbit around the Moon.

Solar-electric propulsion will be a critical enabling technology for this task, which is intended to give astronauts – flying in Orion capsules launched by the massive, in-development Space Launch System (SLS) rocket – access to asteroid material that can be studied in the relative safety of the space between the Earth and the Moon.

Orion made its maiden, uncrewed flight in December 2014, and SLS – the biggest rocket ever built – is due to fly in 2018. A crewed Orion-SLS flight could come as soon as 2021.

NASA is billing all of these projects as “Next Steps on the Journey to Mars”, an ambitious scheme to send crews to the planet from about 2035. ■

**UAS** ARIE EGOZI TEL AVIV

## IAI partner puts Brazilian Heron variant on offer

**A**vionics Services, a Brazilian partner of Israel Aerospace Industries, is offering to produce a “Caçador” version of its Heron medium-altitude, long-endurance unmanned air vehicle, adapted to meet the Latin American nation's requirements.

The Brazilian company has already started the process of preparing production capabilities to build and maintain the Caçador at its Botucatu airfield facilities in São Paulo, following the transfer of technology from IAI, which has a minority holding in it via local subsidiary European Advanced Technology.

The Caçador UAV will be equipped with an automatic take-off and landing system and be capable of carrying a diverse range of multiple payloads for line-of-sight operations, or beyond line-of-sight through the use of satellite communications.

IAI sources say the Caçador is being offered to the Brazilian navy for maritime surveillance duties, and that the service could have a potential initial requirement for up to five systems. ■

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REGULATIONS DAVID LEARMOUNT LONDON

# Pilot groups raise data leak concerns

Failure to follow standard protocols in Germanwings A320 crash investigation risks endangering aviation safety – association

Airline pilot organisations have expressed their shock at the Germanwings Airbus A320 crash in the French Alps on 24 March – but also their distress that international standards for investigation and the release of information are not being followed.

The European Cockpit Association (ECA) says it accepts that the information released suggests the co-pilot probably acted deliberately to destroy the aircraft, but maintains that the failure to respect agreed accident investigation protocols is damaging the process of investigation itself and endangering aviation safety.

In France, a judicial prosecutor always works in parallel with air accident investigators to assess evidence at a crash site.

The expert accident investigator – in this case the French BEA – is the junior partner in the early stages of the activity, and must await the judiciary's assessment and securing of the evidence. Lacking aviation expertise, the prosecutor's sole task is to deter-

mine who is to blame and whether criminal prosecution is appropriate, while the BEA's responsibility is to determine the cause of the crash so as to prevent a recurrence.

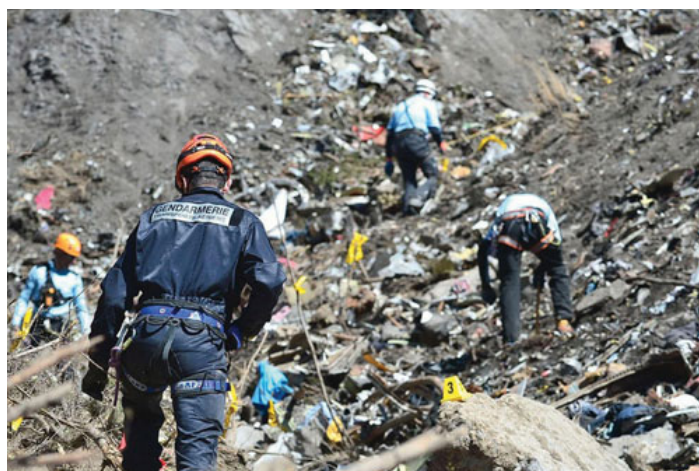
However, this mixing of roles is contrary to ICAO's standards and recommended practices for accident investigation, as set down in Annex 13 to the Chicago Convention.

In the Germanwings case, as soon as the A320's cockpit voice recorder (CVR) had been found and successfully downloaded, the prosecutor announced to the world's media – on camera, and in the presence of the BEA team – that the co-pilot appeared to have deliberately flown the aircraft into the ground. In effect the prosecutor was saying that he was satisfied there was sufficient

evidence to bring a prosecution against the aircraft's co-pilot.

But following the prosecutor's announcement, and two days after the accident, the ECA said: "European pilots are deeply disturbed by the latest turn in the investigation of the tragic Germanwings flight 4U9525 crash. The reports of investigators and French prosecutors that this could be a result of a deliberate attempt to destroy the aircraft are shocking and our thoughts are with the victims and their relatives."

The association then voiced its concerns about the investigative process. "We stress the need for unbiased, independent investigation into the factors leading to this accident. The leaking of the CVR data is a serious breach of fundamental and globally accepted international accident investigation rules. Given the level of pressure this leak has undoubtedly created, the investigation team faces a serious distraction. The required lead of safety investigators appears to have been dis-



Announcements were made while investigation work continues

FLIGHTDECK DAN THISDELL LONDON

## Questions remain over potential effect of rush to enforce two-crew cockpit rule

Among the many repercussions of the shocking revelation that Germanwings flight 4U9525 was deliberately crashed by co-pilot Andreas Lubitz while he was alone at the controls, the most immediate has been a move to require that there be two crew members in a cockpit at all times.

US regulations have long required this two-crew protocol. After the 24 March loss of 150 lives in the French Alps, European low-cost carrier Norwegian moved quickly to change its procedures. "This means that if one of the pilots leaves the cockpit, one crew member must replace him/her during this time," Norwegian says. "Our passengers' and crew's safety always comes first, which is why we have decided to change our procedures, in line with US regulations."

Canadian transport authorities quickly followed the revelations with

an interim rule to ensure that two crew members are on the flightdeck at all times, "to ensure the security of Canadian passengers". Early reports indicate that Air Canada and WestJet have implemented the new rule.

EASA followed suit on 27 March, with a temporary recommendation that airlines ensure that at least two crew members – including at least one qualified pilot – occupy the flight

crew compartment at all times.

Airlines, it says, "should re-assess the safety and security risks associated with a flight crew leaving the cockpit due to operational or physiological needs".

In Europe, national aviation safety authorities have no power to make a binding rule, which would have to come from EASA. As the UK Civil Aviation Authority observes, however, individual airlines are free to modify their own operating procedures. Germanwings parent Lufthansa group has also now adopted the two-crew recommendation.

The US requirement to have two crew members up front at all times was just one response to 9/11. After the attacks on New York and the Pentagon, regulations requiring that cockpit doors be sealed – and reinforced against breakage by

weapons or battering devices such as trolleys or fire extinguishers – were devised to prevent terrorists from taking control.

Those protocols provide for an override to permit a crew member outside the cockpit to gain access should both pilots be incapacitated. However, the post-9/11 protocols also permit the occupants of the cockpit to actively block that override. Alone in the cockpit of flight 4U9525, the Germanwings co-pilot appears to have employed just that "safeguard" to keep the captain locked out after he had left the flightdeck.

But could keeping both seats occupied at all times prevent another pilot from deliberately crashing an aircraft?

The presence of a second crew member may provide some psychological deterrent to a pilot who might



The captain of Egyptair 990 could not tackle relief pilot





**Air Canada A320  
hit terrain at end  
of Halifax runway  
AIR TRANSPORT P14**



**A Germanwings A320  
similar to this aircraft  
was destroyed after a  
controlled descent**

Rex Features

placed by prosecutorial considerations. This is highly prejudicial, and an impediment to making aviation safer with lessons from the tragedy.”

If the BEA alone had been left to release the information, it would have provided established

facts only – and not made any conclusions public at this early stage, however obvious they might appear to be.

The A320 took off from Barcelona, Spain at 10:00 local time for the flight to Düsseldorf, Germany, carrying 144 passengers and six

crew. At about the time the aircraft reached its 38,000ft cruise level the captain left the flightdeck, and very soon after that the aircraft began a continuous but controlled descent to impact. Marseille air traffic control called the Germanwings flight several times, but the

co-pilot did not reply to any of the calls, and the captain was unable to regain access to the cockpit. The chief investigator says the co-pilot manually initiated the autopilot-controlled descent, at a rate of about 4,000ft/min.

“We understand that many facts point to one particular theory for the cause of this event,” the ECA says. “Yet, many questions still remain unanswered at this stage. A key priority for accident investigators – and prosecutors – must be to gather and analyse thoroughly all data, including the technical information about the flight.”

An example of the ECA’s concerns would be the fact of the co-pilot’s breathing, as heard on the CVR. While the prosecutor implied that the breathing indicated the co-pilot was alive during the descent, pilots have commented that some form of incapacitation cannot be ruled out on that information alone.

As a result of the official prosecutorial assumption of the co-pilot’s deliberate destructive action, the ECA argues that the ensuing worldwide media reaction has placed pressure on the BEA, and that this has the potential to influence the investigation. ■



Rex Features

#### **Mandating two crew members in the cockpit offers no guarantees**

have acted more freely if alone, but having two crew members inside the cockpit is no guarantee of safety.

The US National Transportation Safety Board’s investigation of the 1999 Egyptair 990 crash, in which 217 people died, concluded that the relief first officer intentionally flew the Boeing 767 into the Atlantic ocean – apparently “winning” a battle for con-

trol of the aircraft with the captain, who re-entered the cockpit after the descent had been initiated and whose subsequent control inputs were clearly intended to restore safe flight.

Many situations could be imagined in which a second person would be unable to stop a determined pilot from crashing an aircraft. That second person might, for

example, be a slightly-built flight attendant with little hope of physically restraining a potentially larger and stronger pilot. In the USA, however, relative strength may be of no matter, as pilots may carry sidearms.

The one person out, one person in protocol would also keep the cockpit door open for longer than a simple routine whereby one pilot exits, possibly increasing the risk of a cockpit invasion. For such reasons, French pilots’ union SNPL says that EASA’s decision – while understandable – has been reached “in haste”, and without “impact measurement”.

Whether the initial reaction favouring the two-crew rule becomes regulation outside the USA remains to be seen. EASA’s recent stance on regulation generally has been to adopt the view that there are already too many rules, and that adding more undermines the effectiveness of those already in existence. ■



INVESTIGATION JON HEMMERDINGER WASHINGTON DC

# Air Canada A320 hit terrain at end of Halifax runway

Transport Safety Board of Canada confirms that 'substantial damage' was caused by impact before aircraft hit antennas

The Air Canada Airbus A320 that crashed at Halifax Stanfield International airport on 29 March collided with terrain at the end of the runway, the Transportation Safety Board of Canada (TSB) has confirmed. "The initial impact was significant and

caused substantial damage to the aircraft," says the TSB. "The main landing gear separated and the underside of the aircraft was heavily damaged (fuselage and wings)."

Earlier reports had only indicated that the aircraft struck an-



Transportation Safety Board of Canada

Of the 138 passengers and crew on board, 23 were hospitalised

tennas at end the of the runway. The agency says the collision occurred about 1,100ft (335m) from the threshold of runway 05, and that during the incident the aircraft also "collided with a localiser antenna array" that was part of the airport's instrument landing system.

The aircraft then became airborne again, before coming down once more and sliding along the runway, says the TSB. It came to rest about 1,100ft down the runway, with its engines also having separated.

"There is an extensive debris field between the localiser antenna location and the threshold of the runway," the agency says.

The aircraft, registration C-FTJP, was operating flight 624 from Toronto and had circled prior to crashing at about 00:43 local time.

Weather at the time included falling snow and winds up to 30kt from the northwest, according to local reports.

Air Canada says that 23 of 138 passengers and crew were hospitalised, but says injuries were not life threatening.

The aircraft, manufactured in 1991, had CFM International CFM56 engines and had accumulated 74,137h and 30,237 cycles as of November 2014, according to Flightglobal's Ascend Fleets database. ■



Transportation Safety Board of Canada

The main landing gear and engines separated from the fuselage

FLEET MICHAEL GUBISCH AMSTERDAM

## KLM maintains 787-9 plans despite order deferral

KLM's cost-cutting move to defer delivery of two on-order Boeing 787-9s until September 2017 will not affect its plan to have three of the type in service by February 2016.

Speaking in Amsterdam on 28 March, chief executive Pieter Elbers said the deferral – a capital expenditure adjustment within parent Air France-KLM's Perform 2020 efficiency programme and announced along with parent 2014 annual results in February – would not impact fleet introduction of the initial aircraft.

The first 787-9 is set to join the KLM fleet on 25 October, with a second to follow in November and a third in February 2016.

A fourth 787-9 is scheduled to join the fleet in 2016, but Elbers says management is still "optimising the exact influx" of the type, and that the final number of

787s to be operated by KLM has not yet been determined. The carrier previously planned to take deliveries of the type between October 2015 and January 2017.

Elbers denies claims that the delivery schedule was changed because of crewing issues as the

carrier negotiated new labour terms to increase productivity.

Air France-KLM has ordered 25 787-9s and will lease an additional 12 of the type from AerCap. All of the aircraft will be powered by General Electric GENx engines.

Separately, KLM says it will retire its 17 Boeing 747 Combs by 2020, when the last of the aircraft will reach the end of its service life. It may, however, continue operating its four 747F dedicated freighters.

The Boeing MD-11Fs operated by its Martinair subsidiary are already to be phased out as part of Air France-KLM's effort to reduce full-freighter capacity as more cargo is carried on passenger aircraft. "Belly freight is not the same [business] as full freighters," Elbers says.

KLM Cargo sales and distribution senior vice-president Eelco van Asch estimates that some 90% of KLM's cargo can be carried as belly freight, though the under-floor containers' 1.6m (5.2ft) height limit prevents the transport of large machine parts or horses on passenger aircraft. ■



KLM

The carrier says it will retire its fleet of 17 747 Combs by 2020





Alitalia's new ally  
trusts in changes  
**AIR TRANSPORT P16**

**STATEMENT** STEPHEN TRIMBLE WASHINGTON DC

# CS100 schedule called into question

Bombardier CEO Bellemare seems to suggest fresh delay to programme, but company says target dates are unchanged

**B**ombardier's new chief executive appeared to disclose a new delay for first delivery of the CS100 at a press conference in Montreal on 27 March, but the company officially says there has been no change.

In comments reported by the Bloomberg news service, Bombardier boss Alain Bellemare says that first delivery is scheduled in 2016, while certification is scheduled for the "end" of this year.

That timeline conflicts with previous Bombardier statements, including from Bellemare, indicating that type certification and entry into service were "on track" for the second half of 2015 – a period that begins in July.

By using the term "delivery" in the press conference, Bellemare appeared to refer to a distinct milestone that often occurs quickly after type certification and weeks or months before entry into service. The delivery event is also significant for the manufacturer's shareholders, as it represents an event usually tied to a customer payment.

Bombardier spokeswoman Isabelle Gauthier confirms that Bellemare made the remarks at the press conference, but maintains that the company's internal schedule has not changed.

That means type certification and entry into service remain internally scheduled for the second half of 2015, she says. The entry into service milestone could be delayed to 2016 based on the customer's readiness to operate the aircraft, she adds, but that has not been confirmed.

Asked to clarify the internal schedule for the first delivery milestone based on Bellemare's recent comments, Gauthier replied that Bombardier is only discussing the timeline for type certification and entry into service.

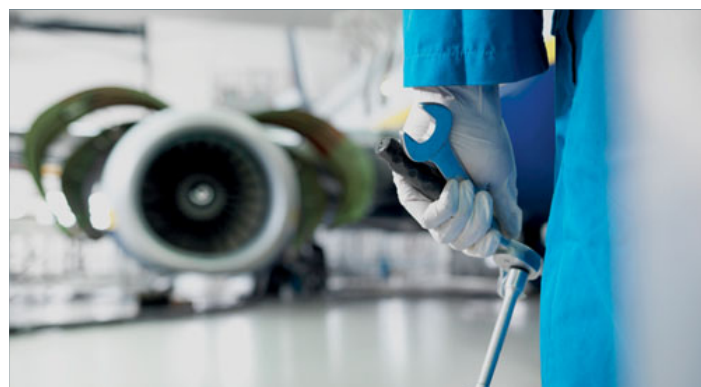
The first CS100 aircraft entered flight testing in September 2013. Four more CS100 test vehicles and the first CS300 test vehicle have since joined the campaign, accumulating more than 1,100h by the end of February.

The flight testing has continued after being disrupted for 100 days last year due to an engine malfunction that required a minor redesign of an oil system. Shortly after flight testing resumed last September, Bombardier activated the normal mode flight envelope protections in the fly-by-wire system for the first time.

Bombardier has confirmed orders for 243 CSeries aircraft, with about 75% of the sales claimed by the larger CS300 variant. ■



The fifth CS100 test aircraft made its flight debut on 18 March



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**SAFETY** DAVID KAMINSKI-MORROW LONDON

## French flights restricted over Yemen and Sudan

**F**rench authorities have added Yemen and Sudanese territories to a list of conflict regions where restrictions on airline operations apply.

All French airlines are being requested not to penetrate the airspace of Yemen, which is covered by the Sana'a flight information region, and to maintain at least 24,000ft altitude while crossing the Khartoum flight information region, including

Sudan and South Sudan. The request, contained in a formal French aeronautical circular, took effect on 27 March and follows a deterioration in Yemeni political stability.

The European Aviation Safety Agency has drawn attention to the circular in a safety information bulletin, and notes a Federal Aviation Administration order banning US commercial flights from Yemeni airspace. ■



RESCUE DAVID KAMINSKI-MORROW LONDON

# Alitalia's new ally trusts in changes

Etihaad chief lays bare politics, over-staffing and debt issues that almost stood in way of carriers' investment partnership

Middle Eastern carrier Etihaad Airways believes the eradication of political influence on Alitalia has been crucial to sealing the pair's investment partnership.

Speaking in London, Etihaad chief executive James Hogan said he had originally been sceptical of the prospects for a tie-up.

"To take on Alitalia, it had to be the right deal," he told an Aviation Club lunch on 26 April, adding that the airline had to understand the reasons why the Italian carrier – which had already been restructured after near-collapse – had started to "go wrong".

Hogan says the airline had been "totally politicised", adding: "No business can work with a rotating chief executive." Alitalia was over-staffed, he adds, and was just "fire-fighting" to service heavy debts.

Etihaad saw potential for network benefits between Alitalia and Air Berlin, with which the Abu Dhabi-based operator also has a partnership, as well as an opportunity to capitalise on its relationship with Delta Air Lines.

But Hogan says that Etihaad could not afford to invest in an operator immersed in a political mire. "There could be no politics," he says. "There are no politics."

Banks forgave the airline's debts. "The debt issue was taken away," says Hogan, adding that the airline was then able to "right-size" the carrier.

Etihaad's involvement in Alitalia centres on an investment in a 49% share in the airline. Hogan is optimistic, stressing that Alitalia's unions have been "fantastic" in backing a three-year accord. ■



Stobart Air is among the carriers who have applied for support

FUNDING OLIVER CLARK LONDON

# UK regional airlines apply for new route start-up aid

BMI Regional, Flybe and Stobart Air are among the UK airlines to have applied to the government for aid to start routes from regional airports.

The Department for Transport says it has received 19 applications from airlines and airports wishing to access £56 million (\$83 million) of funding from the government's Regional Connectivity Fund for the promotion of new routes.

Flybe has applied for aid to enable it to operate services on routes including Norwich to Dublin, Exeter, Newcastle and

Paris, and from Southampton to Lyon and Munich.

Stobart Air has requested aid for services from Carlisle to Belfast, Dublin and Southend; Links Air for Norwich-Newcastle, Durham-Belfast and Oxford-Edinburgh; and BMI Regional for Doncaster-Frankfurt.

The government had been due to shortlist successful applications in March, but has delayed this until July in order to "allow further time to consider all the relevant evidence before determining whether the route meets European Commission guidelines". ■



Investment in Alitalia could provide network benefits, Etihaad says

FLEET MAVIS TOH SINGAPORE

# 787-8s line up for Xiamen long haul

Xiamen Airlines will launch its first long-haul service, to Amsterdam, using Boeing 787-8 aircraft this July.

Speaking to Flightglobal, the carrier's flight planning office manager, Ding Chunling, says this will be the first time it will put its 787s on an international service. The airline's first three of the type have so far been used on domestic services to Beijing and Chengdu since their induction from last September.

"After Amsterdam, we will look at using the aircraft to Australia and North America. In Australia we're looking at Sydney and Melbourne, while to North America we're looking at Seattle, Los Angeles, San Francisco and Vancouver," he adds.

The carrier will take delivery of its remaining three 787s on order in April, June and September.

Ding says Xiamen needs at least 10 787s, and that it is also considering the larger -9 version. ■

CARGO MAVIS TOH SINGAPORE

# Low season grounds Thai 747Fs

Thai Airways International is temporarily grounding its two Boeing 747-400 freighters, as it continues its restructuring plan.

Managing director of the airline's cargo department Poonsak Chumchuay says Thai will "temporarily cease operations" of its two freighters due to "low season" in the second and third quarters.

"It remains possible to use Thai's freighter aircraft to charter cargo flights. Should future market conditions call for an increase in demand to transport goods by

air, the company may resume its freighter services," he adds.

Chumchuay says Thai will continue to provide normal cargo services using the belly space of its passenger aircraft. He says the decision to cease dedicated freighter operations also stems from Thai's ongoing transformation.

Flightglobal's Ascend Fleets database shows that Thai's two GE CF6-80C2B1F-powered 747 freighters were built in the 1990s. Both aircraft are owned outright by the carrier. ■



An increase in demand could put Thai's aircraft back in service





Budget pressures threaten US Army rotorcraft renewal  
**DEFENCE P18**

**INCIDENT** DAVID KAMINSKI-MORROW LONDON

# Stall probe blasts 737 de-icing drill

Body calls for more than Boeing's initial tweak to procedures after elevator jam required Norwegian crew to combat stall

Scandinavian investigators appear unconvinced that new de-icing procedures are sufficient to counter a potential jamming of Boeing 737 elevators, and are pressing for a more robust solution.

Investigation authority SHT's probe into an elevator jam on a Norwegian 737-800, on approach to Kittila in December 2012, has concluded that the aircraft was "close to stalling".

As the aircraft intercepted the Kittila runway 34 glideslope it started to pitch up, eventually reaching 38.5°, and its airspeed decayed to 118kt (218km/h). Both

pilots applied full force to their control columns in a bid to prevent the onset of a stall.

SHT says the elevator would normally respond with a deflection of 50°/s, but that this was 250 times slower on the Norwegian aircraft. Its investigation found that de-icing fluid had frozen on three or four of the input cranks on the 737's elevator power-control units.

After preliminary analysis, Boeing changed de-icing procedures for the tail-cone area of the 737. Introduced in October 2013, this involved spraying fluid at an angle



AirTeamImages

**New protocols have been adopted following the 2012 incident**

from the front rather than the side.

Testing showed the changes "reduced" the fluid penetration, but still enabled a "considerable volume" to enter the tail-cone compartment, says SHT.

"Even after the introduction of new de-icing procedures from Boeing, considerable amounts of fluid and humidity are entering

the [tail-cone compartment] during de-icing," it adds.

Boeing had previously said that it was pursuing a redesign to prevent fluid impinging on the elevator control system, but SHT says it reconsidered this plan, because it would have introduced an "unacceptable risk" of foreign object damage. ■

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MODERNISATION STEPHEN TRIMBLE NASHVILLE

# Budget pressures threaten US Army rotorcraft renewal

Risk of sequestration cuts leaves aviation branch unable to fund modernisation plans while also investing in the future

A futuristic fleet of faster and more survivable rotorcraft are at least 15 years away – but US Army aviation officials are not willing to wait that long to start addressing a lengthy list of needs.

This has placed the aviation branch in the awkward position of attempting to modernise its current fleet and develop an all-new family of replacements featuring breakthrough technology, while coping with a budget constrained by sequestration cuts.

“We want the new capability, but we can’t afford it,” assistant secretary of the army for acquisition, technology and logistics Heidi Shyu told the Army Aviation Association of America’s annual conference in Nashville, Tennessee on 30 March.

The army plans to have a first operational unit of the Future Vertical Lift (FVL) fleet available

in 2030. Two high-speed concepts – the Bell Helicopter/Lockheed Martin V-280 tiltrotor and the coaxial-compound, rigid-rotor Sikorsky-Boeing SB-1 – are being developed for the joint multi-role technology demonstration, which is expected to help the service shape its requirements.

In the meantime, the aviation branch has a long list of priorities for modernising its existing Boeing AH-64 Apaches, CH-47 Chinooks and Sikorsky UH-60 Black Hawks. While these are three of the most capable combat helicopter types in any fleet, they still have limitations, says Maj Gen Michael Lundy, commanding general of the US Army Aviation Center of Excellence.

“Right now, we can’t fly and fight in all environments,” he says. “We don’t have the [engine] power we need.”



More power is required for the service’s current helicopter fleets

In response, the army is funding the improved turbine engine programme; an all-new 3,000shp design to replace the 2,000shp GE Aviation T700 powering the Apache and Black Hawk. GE and a Pratt & Whitney/Honeywell joint venture are competing for a development contract, but it is not clear if this project and another for a 6,000shp-class future affordable turbine engine to power the FVL fleet can both

move forward unless Congress repeals the sequestration policy.

Lundy says the service also wants to accelerate programmes to develop technology to allow its helicopters to land in “brown-out” conditions, and to link them with ground troops by installing the soldier networking waveform across its fleet. Aircraft survivability also must be improved to cope with a new generation of shoulder-launched missiles. ■

ENHANCEMENTS STEPHEN TRIMBLE NASHVILLE

## Chinook upgrades to extend service life into 2060

The US Army is planning to revamp Boeing’s CH-47F Chinook with a series of major upgrades over the next 15-20 years, and wants to continue operating the tandem-rotor type beyond 2060 – 99 years after Frank Piasecki’s heavy lifter first flew.

Boeing’s latest Chinook – the CH-47F – entered production a decade ago, featuring a more powerful Honeywell T55 engine, a single-piece airframe, a glass cockpit and digital flight controls.

The US Army’s current multi-year production deal for the

F model will expire during fiscal year 2019, but Col Rob Barrie, the service’s CH-47 project manager, says a development contract for a Block 2 version could be awarded in FY2017, with remanufactured airframes rolling off the assembly line near Philadelphia from 2020.

The Block 2 upgrade should raise the CH-47F’s maximum take-off weight by 8%, to 24,500kg (54,000lb). As the Chinook’s weight increases, the outdated airfoils of its rotor blades could be replaced by composite blades featuring modern design techniques, including swept leading edges, anhedral tips and better aerodynamic shaping, Barrie says.

Honeywell’s T55-714A is likely to remain the standard through Block 2, but the army could boost the power capacity of the transmission and drive train. The army’s planned 6,000shp-class future affordable turbine engine – or technologies from that effort – could form the basis for a Block 3 upgrade programme after 2025.

More ambitious concepts for the Block 3 activity include extending the length of the fuselage by inserting plugs in the airframe. But while Boeing has toyed with high-speed Chinook designs for decades, the army for the moment is content with the 175kt (323km/h) maximum speed of the CH-47F, says Barrie. ■



Some current CH-47s could be remanufactured to a Block 2 standard





Tern design teams  
ready for take-off  
DEFENCE P20

REQUIREMENT ATUL CHANDRA BENGALURU

# AWACS India market scan ends with A330's selection

Defence Acquisition Council sets aside \$813m to develop widebody early warning platform

New Delhi will proceed with the Airbus A330 as the platform for its ambitious Airborne Warning and Control System India (AWACS India) programme.

In a decision taken on 25 March, the Defence Acquisition Council led by defence minister Manohar Parrikar apportioned €750 million (\$813 million) for the acquisition and preparation of two A330s.

Last October Airbus Defence & Space emerged as the sole bidder for a six-aircraft tender issued in March 2014. India's requirement called for an initial two aircraft, to be followed by four more. Options for four additional aircraft could be exercised at a later stage.

Substantial changes must be made to the A330 to allow the integration of a 10m (33ft)-diameter antenna rotodome, a supporting pylon and onboard mission systems. Certification tasks will be handled by Airbus, while the Bengaluru-based Centre for Airborne Systems – part of India's Defence Research and Development Organisation – will be responsible for the performance of the fully configured platform.



A 10m-diameter rotodome needs to be integrated with the type

India's cabinet Committee on Security granted its approval for the AWACS India programme in February 2012, at which point the project was scheduled to be completed within 84 months. The activity has so far moved ahead with surprising speed, indicating the high importance that has been accorded to it by the defence ministry.

Meanwhile, Airbus continues to wait for the confirmation of an Indian air force order for six A330 multirole tanker transports,

having agreed to extend the validity of its bid until 1 July.

The European company has also emerged as the sole bidder for a deal to replace the Indian air force's Avro HS 748 transports, offering its C295 in partnership with Tata Advanced Systems.

In February, the defence ministry announced that an independent committee had been set up "to look into various issues related to the single-vendor situation before a decision is taken to progress the case". ■

SELECTION  
GREG WALDRON SINGAPORE

## Seoul confirms KAI for future fighter project

Korea Aerospace Industries (KAI) has been selected to lead South Korea's proposed KFX indigenous fighter programme. KAI says Seoul's Defense Acquisition Program Administration has awarded it preferred bidder status, with Lockheed Martin as foreign technical assistance company.

In February, Seoul was forced to re-tender the KFX programme after KAI emerged as the only bidder for the projected 8.5 trillion won (\$8.3 billion) activity. The other interested party was Korean Air, which would have received assistance from Airbus Defence & Space – which has a 46% stake in the Eurofighter consortium.

The KFX is envisaged as a twin-engined replacement for the Republic of Korea Air Force's McDonnell Douglas F-4 Phantom and Northrop F-5 combat aircraft. Seoul's project outline calls for the development of a type with more advanced capabilities than the Lockheed F-16 – but less sophistication than the F-35 Lightning II, at least 60 of which are expected to enter use with the service.

South Korea is expected to eventually acquire 120 examples of the KFX, with 20% partner Indonesian likely to buy 80. ■

EQUIPMENT STEPHEN TRIMBLE WASHINGTON DC

# USAF cues up enhanced helmet for Raptor pilots

The US Air Force has moved a step closer to equipping Lockheed Martin F-22 pilots with a helmet-mounted cueing system.

A potentially multi-year acquisition effort to equip a fleet consisting of about 180 F-22s, including approximately 150 "combat-coded" Raptors, was launched on 23 March with a market research study undertaken by the Air Force Lifecycle Management Command.

The "sources sought notice" will decide whether existing or emerging helmet products can

address a broad range of capability requirements listed by the USAF, including the ability to use the helmet to cue sensors and weapons.

Candidate products should integrate symbology and colour imagery with enhanced night vision systems, and "must not hinder pilot performance during all phases and durations of flights", the air force notice says. This also requests a system that can overlay display imagery on an external field of view generated by a camera.

The solicitation comes nearly two years after the USAF's operational testers began evaluating the Visionix Scorpion helmet-mounted cueing system on the F-22.

Integrating the helmet-mounted cueing system will allow the F-22 to exploit the high off-bore-sight capability of its Raytheon AIM-9X Sidewinder air-to-air missiles. The service plans to integrate the datalinked Block II version of the weapon in 2017 as part of its increment 3.2 upgrade programme for the fighter. ■



The F-22 currently lacks an advanced sighting system

UNMANNED SYSTEMS STEPHEN TRIMBLE WASHINGTON DC

# Tern design teams ready for take-off

DARPA gives risk-reduction contracts to AeroVironment and Northrop to advance unmanned maritime surveillance concept

**A**eroVironment and Northrop Grumman will compete to build a General Atomics Aeronautical Systems Predator-sized unmanned air system to be launched from and recovered aboard a naval patrol vessel, the US Defense Advanced Research Projects Agency (DARPA) has announced.

The Tern – a name originally assigned as an acronym for a “tactically exploited reconnaissance node” – has no immediate customer lined up, but that is not DARPA’s goal for the initiative.

Instead, the agency responsible for introducing stealth technology is seeking to deliver a new breakthrough in the UAS market. If either the AeroVironment or Northrop designs prove successful, the Tern will deliver a new level of basing flexibility for a medium-sized UAS that can roam hundreds of miles on missions lasting



**A Predator-sized tail-sitter features in notional depiction of type**

several hours. That level of capability has until now been reserved exclusively to land-based aircraft, such as the Predator or Israel Aerospace Industries Heron.

The Phase 2 contracts awarded by DARPA on 23 March narrow the Tern competition to AeroVironment and Northrop, excluding previous bidders which also included Aurora Flight Sciences,

Carter Aviation Technologies and Maritime Applied Physics.

Both selected contractors will work on preliminary design and risk reduction activities during Phase 2, before a follow-on award will be given to one of them to build a full-scale Tern demonstrator for ground-based testing under Phase 3 of the programme. DARPA suggests that the ground-

based testing “would lead” eventually to a full-scale, at-sea demonstration of a prototype vehicle on a destroyer-sized vessel.

The agency – which has restricted the bidding teams from revealing most details about their aircraft proposals – has released an image of an artist’s concept for a notional Tern vehicle. This reveals a tail-sitter, twin-engined design resembling a Predator airframe, but with a sharply dihedral mid-wing and the Predator’s familiar anhedral stabilisers. The concept vehicle is shown equipped with an electro-optical/infrared sensor and without armaments.

A dedicated launch and recovery system for the Tern UAS is not visible on either vessel shown in the image, and it is unclear whether this concept would require catapults or nets for launch and retrieval aboard ship. ■

## DELIVERY

## Spartans begin to arrive in Peru

**P**eru has received its first of four C-27J Spartans, with Alenia Aermacchi expecting the type to undertake tasks from Callao air base including passenger and cargo transport, humanitarian relief flights, search and rescue missions and fire-fighting.

Formally accepted in Lima on 27 March, lead aircraft FAP-328 is the first of two examples ordered in December 2013 for the Peruvian air force, which doubled its commitment one year later. Deliveries are scheduled to conclude during 2017. ■

## PERFORMANCE CRAIG HOYLE LONDON

## C295 winglets make Mexican debut

**M**exico has taken delivery of the first production example of the winglett-equipped C295 medium transport, which Airbus says will provide extended-range performance and a 4% increase in fuel efficiency.

Flown from Airbus Defence & Space’s Seville final assembly site in Spain, the Mexican navy C295W carries the registration ANX-1524. It is the first of two aircraft included in a follow-on order for the service announced by the manufacturer last October. The pair will join four C295 transports, which Flightglobal’s Ascend



**The enhancement will become standard on the Airbus transport**

Fleets database shows as having been built in 2009 and 2011.

Airbus – which announced plans to offer the enhancement

for the twin-engined turboprop in May 2013 – says “winglets will be standard for all new C295s delivered from now on”. ■

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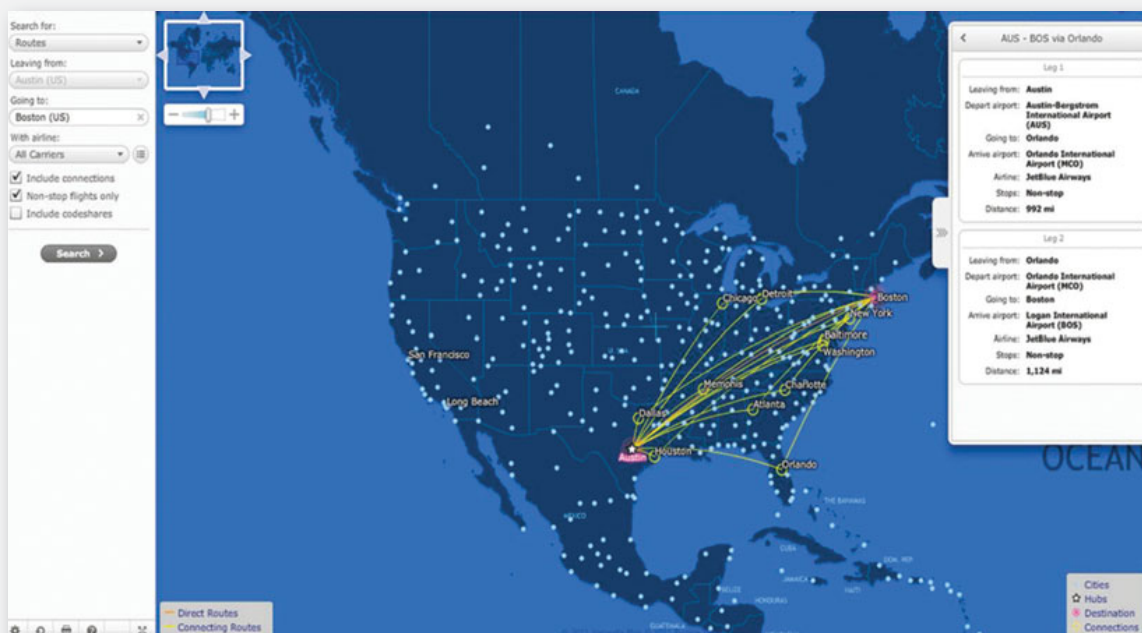




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## PROGRAMME

STEPHEN TRIMBLE WASHINGTON DC

## HondaJet wins provisional type certification

A newly-awarded provisional type certificate (PTC) for the HA-420 HondaJet has brought the North Carolina-based manufacturer a big step closer to success in its 12-year-long quest to enter the light business jet market.

Honda Aircraft chief executive Michimasa Fujino calls the award of the PTC by the US Federal Aviation Administration a "tremendous milestone".

A PTC is requested by the manufacturer and establishes the aircraft as safe to fly, based on the airworthiness standards outlined in the document. It stops short of authorising the company to deliver the aircraft to customers. That requires a final type certificate, which will come in a "few months", Honda Aircraft says.

Fujino adds: "Honda Aircraft has completed nearly all the testing and reports required by the FAA, and we are very close to achieving final type certification for the world's most advanced light jet."

The HA-420, distinctively equipped with over-the-wing GE Honda Aero Engines HF120 engines, will enter a market sector occupied by the Embraer Phenom 100 and Cessna M2.

**"We are very close to achieving final type certification for the world's most advanced light jet"**

MICHIMASA FUJINO

Chief executive, Honda Aircraft

HondaJet first flew a prototype of the model in 2003. After re-engining and improvements, four HA-420 flight-test aircraft have flown more than 2,500h.

The final assembly line in Greensboro, North Carolina, is fully occupied with 12 aircraft. Five more are at earlier stages of production, the company says. ■

TURBOPROPS KATE SARSFIELD LONDON

## Epic readies E1000 for maiden flight

Epic Aircraft is preparing the first E1000 single-engined turboprop for its first flight in June and plans to deliver the first of the six-seat, high-speed types early next year.

The \$3 million, Garmin G950-equipped E1000 is a certificated, factory-built version of the \$1.95 million Epic LT kit-built aircraft, which the company stopped selling last year. "Serial number 54 was the last LT to be sold," says Epic director of sales and marketing Mike Schrader. There are currently 48 of the type in service and another six in various stages of construction.

Schrader says LT owners make up around 10% of the 60-strong orderbook for the Pratt & Whitney Canada PT6A-67A-powered E1000. "We have received a phenomenal response to the aircraft from existing turboprop owners, as well as operators of high-performance piston singles and twins," he says.



The turboprop is a factory-built version of the Epic LT kit aircraft

Schrader puts the E1000's popularity down to its relatively low price – and its "impressive" performance characteristics. These include a projected maximum cruise speed of 325kt (600km/h), a range of 1,650nm (3,060km) and a ceiling of 34,000ft.

Epic is currently building a service centre network across the USA to support the fleet and show its commitment to aftersales care. "We are talking to established business aviation services provid-

ers that offer PT6, Garmin and composite servicing capabilities," says Schrader. "We plan to have six service centres initially, but will expand as the fleet grows."

The Bend, Oregon-based airframer is planning to deliver between five and 10 E1000s in 2016, increasing to around 50 a year in 2018. Two aircraft will be involved in the flight test campaign. The second E1000 is under construction and is expected to take to the skies in October. ■

TESTING KATE SARSFIELD LONDON

## Second Falcon 8X takes off

Serial number two achieves milestone for Dassault's flagship business jet programme

Dassault's second Falcon 8X ultra-long-range business jet made its maiden sortie on 30 March – less than two months after the French airframer kicked off the flagship tri-jet's flight test campaign at its Bordeaux-Mérignac facility.

Serial number one, which is dedicated to flight envelope expansion, has flown 40h since taking to the skies for the first time on 6 February.

The second aircraft will focus on performance, while serial number three – a fully conforming 8X currently under construction and scheduled to fly later this year – will help with cabin systems and preparation for entry into service. The trio are expected to fly around 500h before certification is secured next year, and

deliveries will follow soon after. Powered by three Pratt & Whitney Canada PW307D turbofans, the \$57 million 8X has a range of 6,450nm (11,950km), allowing it to connect Paris with Beijing, and São Paulo with Los Angeles and Moscow.

Dassault's 19-seat, fly-by-wire flagship is a stretched, longer-range version of the 7X – of which more than 250 examples have been built since it entered service in 2007.

Last month Dassault performed the first 7X C-check, paving the way for the start of routine overhauls on the long-range type. "C-checks are the largest scheduled maintenance events on the aircraft and are due every eight years or every 4,000 cycles," says Dassault. "The 7X in-

volved in the initial C-check is seven years old and has flown 1,340 cycles," it adds.

The work, carried out at Dassault's company-owned Falcon service centre (DFS) at Paris Le Bourget, entailed bringing the aircraft up to the latest operating standard, renovating the interior, repainting the exterior and installing a satellite communication unit, Dassault says. A second 7X C-check and cabin renovation is currently under way.

"DFS has invested heavily in preparing the C-check programme for the 7X," Dassault continues. Two hangars have been set aside at Le Bourget and a second facility will open in Bordeaux-Mérignac in 2016. This installation will be equipped to handle six aircraft simultaneously," it adds. ■





A310 proves gravity of Zero-G's work  
NEWS FOCUS P25

PROGRAMME DAN THISDELL LONDON

# Galileo refinds way with 'easy' launch

Successful placement of seventh and eighth satellites has put European navigation constellation back on the right track

After a decade lost to false starts and budget wrangling, and a partial launch failure, Europe's bid to have its own satellite navigation system received a huge boost from what appears to have been a perfect mission to orbit the seventh and eighth spacecraft in what will eventually be a 30-unit constellation.

Indeed, with the successful 27 March orbiting of Galileo spacecraft 7 and 8 after an "easy" launch campaign, the programme is finally "approaching the cruise mode of production, testing and deployment", says Didier Faivre, the European Space Agency's Galileo director.

Two more satellites are being readied to fly in September, again atop a single Soyuz rocket, from ESA's French Guiana launch complex, and another two are expected to follow before year-end or very early in 2016. Faivre says that all the pieces are now in place to maintain a six-per-year schedule: production by OHB in Germany using navigation payloads built by Surrey Satellite Technology in the UK; testing at ESA's ESTEC facility in the Netherlands, which will receive the next two units in April; and launch by ArianeSpace from South America.

Exact launch dates depend on finding slots in ArianeSpace's busy flight manifest, which includes another eight to 10 flights this year. And, says Faivre, space in the schedule is not the only factor that will dictate the timing of the first 2016 deployment; that also depends on readiness of the first Ariane 5 ES launcher, capable of orbiting four of the 700kg (1,540lb)-class satellites at once.

But at this point the expectation is that the 26 satellites ordered so far will be in orbit in 2018. And, if ESA and the European Commission, which is paying for the constellation, reach agreement this year or early in 2016 to buy the remaining four, the production-testing-launch regime should have 30 flying in 2020.



The payloads were launched from ESA's complex in French Guiana

What is really on the table – and Faivre stresses that ESA and the Commission are on the same page as far as Galileo is concerned, but that budgets have always to be realised – is an order for up to six more spacecraft, to have spares either in orbit or ready to launch.

In any case, once 10 are flying and commissioned – a threshold that should be reached around year-end – the Commission will be in position to begin offering initial services. Geographic coverage and accuracy will increase as more satellites are launched, up to the full constellation of 27 spacecraft and three in-orbit spares.

## PERFORMANCE

The latest launch was a big moment for Galileo, putting the programme back on track. Four in-orbit validation (IOV) units were launched by Soyuz in 2011 and 2012, and have demonstrated performance beyond expectations. Where specification had been for accuracy to 4m (13ft) horizontally and 8m vertically, they have provided 2 x 4m accuracy.

However, the August 2014 launch of the first two production

**The expectation is that the 26 satellites ordered so far will be in orbit in 2018**

units looked at first to have been a practical failure, with a "major anomaly" in the rocket's Fregat upper stage leaving them in a useless orbit – and pushing back Brussels' hopes of initiating partial services by a year. Initially, ESA feared that the satellites, although under control, would become expensive vehicles for the sort of extreme, in-orbit stress testing for which a useful spacecraft would never be spared.

In the end, both were coaxed to useful orbits and, says Faivre, it will be possible to adapt the ground mission to make them fully useable for navigation. Those adjustments, he adds, will take several months and cost "a few million euros" – a fraction of the cost of replacement.

Meanwhile, the urgency of holding to a high-tempo launch programme – and ultimately of having some spare satellites on

the ground and ready for launch – is underscored by the condition of the IOV units. These are expected to perform as part of the functional constellation, but one of them has suffered a partial antenna failure and the others, being identical, are at risk of the same fault. Faivre says, however, that a software patch has been developed to give his team better early detection of pending trouble.

At this point, whether the Galileo timetable moves forwards or back by a few months is immaterial. The project was conceived in the late 1990s and first agreed at the European level in 2003. But by 2007 it was adrift amid technical issues and budget wrangling, leaving the Commission to decide in 2008 to fund the project entirely from the EU budget.

The programme continued to move in fits and starts until 2011, when Antonio Tajani, then Commission vice-president for industry and entrepreneurship, made the completion of Galileo a cornerstone of his leadership. That year he brokered an agreement to break a cycle of delays by winning concession from industry partners to cut €500 million (\$684 million) from the programme's industrial costs, to help fund the purchase of enough satellites for near-global coverage and initiate a fast-track launch schedule.

Tajani's determination reflects the Brussels view that satellite navigation is a critical capability over which Europe must have sovereign control. Unlike the USA's military-operated GPS system, Galileo was designed from the start for civilian use and oversight. And technically it will offer some advantages over GPS, notably better performance at high latitudes – an obvious European priority.

Galileo, which will be compatible with GPS and Russia's Glonass, also claims to be the first satellite system to integrate a global search and rescue function, providing almost real-time localisation of distress calls. ■

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Building strength  
COVER STORY P26

SPECIAL PURPOSE AIRCRAFT DAN THISDELL LONDON

# A310 proves gravity of Zero-G's work

New arrival enables Novespace to offer more precise control to scientists and double public 'weightlessness discovery' slots

Repeatedly pulling 1.8g in fiercely steep climbs and dives is no way for an airline to treat its customers, but at one of the world's most specialised operators, that is what they are paying for. Now Bordeaux Merignac-based Novespace is set to give even more passengers such a thrill, having taken delivery of a "new" aircraft.

Actually, the 22s or so between those climbs and dives is the purpose behind the activity, as the name of the aircraft makes very clear. "Zero-G", an Airbus A310 that previously served the German air force VIP fleet as "Konrad Adenauer" (registration 10+21, now F-WNOV), is one of just a handful of aircraft in the world capable of letting scientists and astronauts work, for brief stretches, in micro-gravity without travelling to space. A US company, Zero G, operates a modified Boeing 727-200 and Russia's state astronautics agency has an Ilyushin Il-76, and the National Research Council of Canada has a smaller Dassault Falcon 20.

## WEIGHTLESSNESS

The trick is to fly a parabolic flight path, pulling up to 1.8g in a steep climb that gains some 8,200ft in altitude in 30s, then cruising over the hump and diving back down to resume level flight. A typical outing – from Bordeaux, Novespace flies out over the Bay of Biscay – can include 15 to 30 of these parabolic manoeuvres, providing many valuable minutes of effective weightlessness, for science experiments or astronaut training.

But while the aircraft is operating inside the normal 2.5g design limit of a civil airliner, its radical flight pattern is very hard on the structure. More than 13,000 parabolas in nearly 18 years of service wore out the old Zero-G – the third A300 built by Airbus – so it was retired in October 2014.

Novespace director general Thierry Gharib tells *Flight International* that the A300 remained airworthy, but that maintenance was becoming very expensive;



Novespace's A300 replacement required major modifications to ready its structure for parabolic flight

the coefficient of fatigue on parabolic flights is 35 times greater than on a normal commercial service, so the aircraft needs 30 times the structural inspection of an airliner. Hence, on an ageing airframe, maintenance, he says, had become a "headache", especially as some spare parts had become unobtainable. The A310, however, will be much easier to maintain, and also brings with it other safety advantages characteristic of newer models.

Gharib says there are other advantages to the new aircraft. With a glass cockpit and a new flight control system, Novespace expects to be able to provide its customers with more precise control of what were already "excellent" microgravity conditions during the parabolic manoeuvre. This is especially important on scientific missions, when researchers need to reproduce conditions as closely as possible on each trial.

The A310 will also provide extra electrical power – up to 50% more, eventually – which Gharib says is important for increasingly demanding experiments.

## MODIFICATIONS

Lufthansa Technik converted the A310 from its German air force configuration in Hamburg. Various frames and other structures had been weakened by the original VIP conversion, so before a new interior could be installed for Novespace, the company had to bring the aircraft back to its original condition and verify its structural integrity – a job that involved some 1,300 airframe modifications.

A series of test flights has begun, to validate the new flight control system and for pilot training, with a return to scientific flying scheduled on 5 May.

Novespace is a subsidiary of the French space agency, CNES, and

also counts the European Space Agency and Germany's DLR aerospace agency as its main customers. The plan is to continue to provide them with about 18 flights per year, but Gharib says that a programme of public "weightlessness discovery" flights introduced in 2013 through a Novespace operation called Air Zero G will expand, from three flights in 2014 to six sorties per year.

These "discovery" flights have two purposes. One is to help communicate to the public the nature of this programme as a scientific venture. But the other is to raise revenue, and reduce the cost to CNES, ESA, DLR and other scientific users. With up to 40 spaces available on a public flight at €6,000 (\$6,500) per seat, the potential is clearly not insubstantial.

The trick, says Gharib, is to offer a worthwhile number of public flights without cutting into the life of the aircraft – which he hopes will be 15-20 years, on a par with the outgoing machine.

While the previous Zero-G aircraft will not be flown again, its mission as a science platform continues. Today, it sits on the tarmac at Cologne Bonn airport, which bought the A300 from Novespace for €1. Soon, it will be craned to a position in front of the terminal building, where the airport plans to offer public tours.

"The more people who know about our activities, the better," says Gharib. ■



ESA's Alexander Gerst tasting microgravity before his ISS mission



# BUILDING STRENGTH

**FELIPE SALLES** RIO DE JANEIRO

**E**mbraer has a long tradition of identifying – and succeeding in – unattended market niches. Over the years, it has done this with regional turboprops and jets, turboprop trainers and counter-insurgency aircraft, airborne early warning aircraft, light business jets and now the mid-range military transport segment, where the Lockheed Martin C-130 Hercules has reigned supreme for more than 60 years.

The Brazilian transport programme started off in 2007 as the C-390, a simpler, low-tailed Embraer E-190 derivative with a new transport fuselage. Significantly transformed, the enlarged KC-390 was relaunched from scratch and has now cleared two key milestones in a row: the first prototype roll-out ceremony last December, and first flight in February. The next stage to be crossed will be the full start of the flight-testing programme.

“The KC-390 programme has been developing on schedule, and the delay to first flight from the end of December to 3 February was only due to minor issues such as

the two to three days needed to switch a faulty component in the prototype,” explains Col Sérgio Henrique da Silva Carneiro, KC-390 programme manager in the Brazilian air force’s combat aircraft co-ordinating committee (COPAC).

“There was no rush to get to the first flight, which was more than just a take-off and landing to prove the plane can fly. It was much more complex than that: a 1h 19min test flight in full telemetry gear.”

After that first – and only, as this article went to press – flight, the prototype was returned to the manufacturing hall to receive some pending components and systems needed for the start of the complete flight certification schedule.

“That flight was done with a reduced flight envelope, but it was enough to allow us to say that the aircraft’s behaviour so far is either as planned or better,” says Embraer’s vice-president and KC-390 programme director, Paulo Gastão Silva.

“Low-speed flight stability, for instance, turned out better than we had aimed to achieve. The close matching of the observed

flight characteristics to what we planned in our digital model is a very good sign that we may run into fewer surprises down the road.”

The second KC-390 prototype is scheduled to fly by mid-2015 – soon after the first returns to flight. They are followed in the production line by two complete airframes to be used for ground-based testing. Another two partial airframe structures will also be used, to speed up the certification process.

Immediately after these four test airframes, the first production examples for the Brazilian air force will start rolling out from the expanded Gavião Peixoto manufacturing plant. The manufacture of the first production-standard aircraft is under way, with their long-lead items already contracted to Embraer suppliers.

## GIANT-SIZED GENESIS

“The Brazilian air force and Embraer always had a clear notion of the size of the challenges that come... with large technological leaps forward,” says Carneiro. “But we also know there tends to be greater learning for industry in defence programmes than in civilian ones.





The first of two prototypes made its maiden flight in February

Embraer has put a huge amount of developmental effort into its KC-390 military tactical transport programme, creating a powerful challenge to Lockheed's Hercules

"The KC-390 programme represents a step up in capability for both Embraer and its suppliers. Leaps like these are the result of well-managed defence programmes, bringing greatly positive results for the Brazilian aeronautical industry. Military requirements are continuously evolving, since this is the 'cutting edge'."

When the original C-390 was conceived, the designers knew it already brought with it a number of new challenges for Embraer. The effort and risk of creating a totally new fuselage with an integrated rear cargo ramp and other new items was then offset by using as much as possible of the tried and tested engines, systems and equipment from the very successful civilian E-Jet family.

A new extended wingtip would be needed, as well as a new wing stub structure connected to the centre fuselage structure. This transformed the original shorter E-Jet wing, moving it from its original low-wing dihedral into a totally new high-wing anhedral installation. This was Embraer's first high-wing design.

The designers felt the C-390 was both viable and technically feasible as a military

transport, but it was clear it would be an aircraft of a lesser category in terms of loads and weights, in line with the French-German C-160 Transall rather than the market's yardstick, the C-130J.

At this stage, Embraer was able to obtain assistance from the Brazilian air force, "an experienced service that deeply understood the military transport mission and is competent in writing detailed military requirement lists needed to properly evaluate the new concept", says Gastão Silva.

The Brazilian air force already had a formal process for that purpose, so in an exploratory manner it contributed by writing an operational requirement, followed by a technical requirement, for the C-390 concept. This helped Embraer understand that its original concept answered the needs of only a part of the existing C-130 global client market. But the largest slice of that pie would be beyond its means to capture.

The logistical and industrial technical requirements were written by an air force working group. With a total of some 1,500 lines, the resulting requirement book revealed beyond

doubt that the C-390 concept did not meet the service's minimal performance needs. Intended as the base for the development contract of the new aircraft, the requirements document instead became its death knell.

Surprisingly, Embraer management started again from scratch, and created a completely new aircraft. According to Gastão Silva, in the end Embraer's development effort with the new KC-390 would amount to 130% that of the whole E-Jet family.

#### OFF-THE-SHELF

The C-390 concept's size was inadequate. To be a commercial success in the military market it would have to be of equal or larger size than the Hercules. Embraer studies showed that while the company's civilian E-190 had a wing area of 92m<sup>2</sup> (990ft<sup>2</sup>) and the C-390 concept would have had a wing area of 108m<sup>2</sup>, the newly-designed KC-390 ended up with a much larger wing area of no less than 140m<sup>2</sup>.

The selection of a civilian-proven engine helped to reduce the flight-testing workload, but the International Aero Engines V2500-E5

» variant used on the KC-390 has been adapted to better suit it to its unique military mission. The same applies to the Rockwell Collins Pro Line Fusion cockpit displays. While BAE Systems was hired to supply the primary flight commands, all the aircraft's fly-by-wire control laws were written in-house by Embraer.

"The KC-390 brought with it a number of good surprises for us," Carneiro says. "We made flying this plane a very automated process, beyond the automatic pilot computers, protecting the plane from pilot inputs that might push it outside its flight envelope."

Regarding export opportunities, Gastão Silva says that "creating a 100% ITAR [International Traffic in Arms Regulations]-free product would have been a pointless goal, because even Brazilian-developed and sourced items have export control rules that apply to them. Every government whose companies produce military solutions and products – not just the USA – tends to reserve the right to control where that technology is going to end up."

He adds: "Even some civilian-used products embed ITAR components such as the FADEC digital engine controls of the IAE V2500 engines" developed to power civilian airliners, but eventually used in the KC-390.

Another risk mitigation initiative involved the substantial use of simulation and computational fluid dynamics studies, as well as ground rig-based testing. A total of eight windtunnel testing campaigns were undertaken, two of which were for the original C-390 concept. These campaigns were used to evaluate several trade-off issues such as the wing-tip options.

Gastão Silva explains that "depending on the client air force's average operational flight profiles, it might be an advantage to fit a winglet or another shaped wing-tip extension to its particular KC-390s. The wing structure, for instance, is designed and built to allow for simple alterations like that to be performed in the future."

Another area where the early windtunnel tests proved helpful was in the determination of the optimal engine pylon configuration. Gastão Silva mentions that the prototypes have silver-coloured engine pylons because of their hot running engine bleed air-driven internal components. At high temperatures any paint would be burnt away. To address the Brazilian air force's request for camouflaged pylons, Embraer is currently searching the market for an adequate heat-resisting paint.

During its development process, the empty weight of the KC-390 has naturally grown, but so too has the engine power and aerodynamic efficiency of the design performance – so all the key performance items have been met by the aircraft flown by Embraer.



The test flight lasted 1h 19min with a full telemetry system

"The air force never specified a minimum empty weight parameter to Embraer in this programme," COPAC president José Augusto Crepaldi says. "The KC-390 today has become capable of lifting 26t if this weight is concentrated in a limited area near the centre of gravity of the aircraft."

#### INTERNATIONAL STRATEGY

The KC-390 is a fully-fledged international partnership, with Argentinian, Portuguese and Czech Republic flags showing up on the cockpit sides of the prototype at the roll-out ceremony. Besides these countries Embraer also reached out to Turkey, Chile, Colombia, South Africa and the United Arab Emirates as potential industrial partners.

Foreign involvement began at a defence ministry level before progressing to air force commands and then reaching the aerospace industry. Chile and Colombia are still committed to the KC-390 programme, for 12 and six aircraft respectively. Chile was expected to join the KC-390 programme through manufacturer Enaer, but due to a change in government and the costs of the 2010 earthquake it eventually missed that window of industrial opportunity.

NATO countries Portugal and the Czech Republic are seen as key in leveraging sales of the KC-390 to European air forces. These countries' industries also benefit from regional development programmes through low interest rates aimed at aerospace opportunities and industrial development. This financing will mostly be used for pre-manufacturing and series manufacturing non-recurring work.

The contract signed by the industrial partners with Embraer covers both prototypes and series production work. "It is a win-win game," says Carneiro.

The KC-390 is expected to be composed of 50% Brazilian components by cost. "An aircraft is substantially different from oil rigs or even submarines", says Carneiro, referring to other large industrial transfer-of-technology programmes being developed in Brazil today.

"Why does a beetle fly?" asks Gastão Silva. "Because he never went to aerodynamics class! We took the leap of faith of designing a type of aircraft we had never designed before because we didn't know then how complicated it would be to design a brand-new, world-class, jet-powered tactical transport like the KC-390. We faced an enormous challenge in this programme – in reality it was not one but several specific challenges that had to be overcome."

#### MANAGING RISK AND COST

Embraer aircraft development programmes use a technology readiness index to determine the degree of risk represented by each possible type of innovation to be adopted in the new model. By sticking to the most mature technologies, the company cuts the overall programme risk.

A risk management plan was developed identifying the greatest risks, so during planning the search for their solution was intensified. One of these risk-reducing measures was the hiring of foreign consultants during the initial phases, to assist on some of the more complicated parts of the new aircraft such as the configuration of the rear cargo door and rear pressure bulkhead. This item's complexity is derived from multiple independent aspects such as fuselage pressurisation, resistance to operations from unprepared airstrips and the need to guarantee an unobstructed cargo "launch corridor" in the rear of the cargo compartment.





This aims to reduce the risk of air-launched cargo pallets rubbing against the sides or eventually getting stuck in the rear door, potentially causing a fatal accident. The “unobstructed corridor” was the main reason for the adoption of the “T” tail configuration and for the raising and re-contouring of the rear fuselage. Without it the height of air-launched pallets would be more limited, which would have an impact on the KC-390’s operational flexibility.

Another key area identified by the Brazilian company was the complex automated cargo handling system/aerial delivery system (CHS/ADS) needed to allow easy movement of containers/pallets into and out of the aircraft. The KC-390’s cargo compartment floor sections can be easily flipped over, exposing or hiding rollers and tie-down rings of different strength levels to be used from light pallet loads all the way to heavy armoured vehicles.

The ADS element of the system specifically refers to the safe and fast in-flight release of military cargo. Civilian cargo transport operators are totally unfamiliar with this area, where restraints have to pop open at the right moment or where extractor parachute cords in an emergency might have to be sheared to preserve the safety of the crew on a mission. A jammed cargo load well to the rear of the aircraft’s centre of gravity is a critical – if not deadly – situation.

#### PROTOTYPING STRATEGY

The decision to use only two prototypes, according to Gastão Silva, was mainly due to the limits of development funding from the air force. “This number is fully compatible with the KC-390 programme’s allotted development budget. A smaller number of prototypes demands from Embraer a much better flight-testing and certification campaign plan”.

Regarding the number of prototypes, Carneiro argues that “based on Embraer’s experience developing new aircraft, the use of risk-mapping strategies, the extensive use of simulations and the selection of mature technologies, we became confident that this would work well.

“Both prototypes are expected to be flown in tests for at least two to three years. When the first production aircraft are delivered, they will also be used to conclude the military type certification phase side by side with the prototypes”.

Carneiro also says a lot of work has been focused during development on ensuring the through-life cost of the KC-390 would be the lowest possible. The programme contract has transfer-of-technology clauses for eight “strategic” subsystems, including engines, flight controls, avionics, landing gear, self-defence systems, cargo handling systems and mission systems. These transfer-of-technology offsets can vary from the local manufacture of a certain systems or equipment all the way to a

technical course COPAC and Brazilian industry believe will add value to the local industrial capabilities.

A new 30,000m<sup>2</sup> final assembly hangar was built in Gavião Peixoto to accommodate the KC-390 line. The L-shaped hangar hosts five assembly stations. Built at another hangar, the fully assembled fuselage enters through a door at the bottom of the “L” shape, progressing upwards. In the horizontal part of the “L”, both half-wing assemblies are mated to each other before being installed over the fuselage. Also here, the horizontal stabilisers are assembled on top of the vertical tail before the completed structure is bolted to the fuselage. All components enter the final assembly hall fully painted.

#### MANUFACTURING THE GIANT

Some of the KC-390’s major fuselage components come from the Embraer aerostructures plant located at Botucatu, 175km (109 miles) away from Gavião Peixoto. Some subassemblies are built locally at Gavião Peixoto and others come from the company’s headquarters at São José dos Campos. Other parts come from the new, highly-automated Embraer plant in Évora, and from OGMA, both located in Portugal. OGMA is responsible for the complete central fuselage assembly delivered in the shape of “super panels”. All foreign-built components are to arrive by ship, and then driven to Gavião Peixoto.

When the production reaches its full rate, around 1,060 jobs will have been either created or preserved at Embraer, while another 1,500 were created in the engineering design group just for this programme. The marketing effort has run continuously from before the programme’s launch at the LAAD 2007 show, but international sales activity only started at the beginning of 2014. With the KC-390’s configuration frozen then, Embraer could finally make firm commitments regarding the type’s performance, price and delivery schedule. There are several active sales campaigns underway around the world today.

#### THE FUTURE

Unveiling part of the company’s marketing plans, Gastão Silva says the current configuration is just the first of a family of aircraft in an overall product roadmap. “We foresee a market need for a stretched variant of the basic military transport for those clients whose cargoes have a greater density variation,” he says.

The current KC-390 cargo hold is already larger than the standard C-130’s, holding seven pallets instead of six, while its stretched variant will hold nine pallets; one more than the C-130J-30. Troop transport is one of those missions that is better suited to a stretched airframe. ■



The aircraft exited its construction hangar for a roll-out ceremony on 21 October 2014

# GRIPEN'S BRAZILIAN FLAVOUR

The Brazilian air force's selection of the new generation of Saab's multirole fighter will bring thousands of jobs to local industry through a sophisticated chain of suppliers

FELIPE SALLES RIO DE JANEIRO

The Gripen NG selection by the Brazilian air force nearly a year and a half ago guaranteed the new model's future – and kickstarted a delicate negotiating process to define the shape of the Brazilian supply chain, as well as the dual roles of local aircraft maker Embraer and the type's certificate holder, Saab.

The detailed plans for the Brazilian industry's work share are still being negotiated and are expected to be finalised during the first half of 2015. But some preliminary details are already accepted. For example, Embraer will perform systems development and integration, software development, final assembly and flight testing. Mectron, a Brazilian sensor and missiles house, will be assigned the communications and data link systems, as well as weapons integration.

The Brazilian air force's Technology Command is responsible for research and technology regarding future fighters. AEL, a subsidiary of Elbit Systems, does avionics development and integration.

Embraer's subsidiary, Atech, will do the training systems, simulators and development rigs. Akaer will be responsible for extensive parts of the airframe structural design.

"This is the right time for a country like Brazil, since now we are in a 'buyers' market', we can demand a lot of things," says Brazilian air force commander Gen José Augusto Crepaldi Affonso. "Paying to get access to new technology is always easier but there are things that are just not for sale. Brazil is not taking its first steps – its technology readiness level [in aerospace] being already considerable. Because of that we have to be very precise on what type of technology we will request from our partners."

Crepaldi explains further: "We did know from the start that we wanted knowledge that

would be able to push us beyond the F-X2 fighter level." The air force chose to call the Brazilian defence industry, asking which technologies would push local capabilities into the realm of fifth-generation fighter aircraft.

These technological areas were specified by industry, and the air force relayed exactly that to the three foreign bidders for the fighter contract – which also included Boeing and Dassault. The air force's previous experience in the AMX and the A-Darter missile programmes has proved that the only way to absorb this technology is by doing the development together.

"There were two main objectives: first to obtain the engineering skills that would allow us achieve a strategic independence," Crepaldi says. "Second, for those items where this could not be transferred, we focused instead on acquiring the local means for enhanced Brazilian industry-based through-life support for the Gripen NG and its systems. Some of the key areas for [technology transfer] in the F-X2 were: engine, radar, structure, electrical systems, software development and weapons integration."

The air force policy stopped short of pre-selecting which Brazilian companies would receive the transferred technologies as a result of the fighter competition. According to the terms of the F-X2 tender, it was up to the three bidders alone to contact and select which companies would become partners in their commercial proposal to the air force.

To ease their task, a complete listing of Brazilian aerospace companies already certi-

**"It's the right time for Brazil – we are in a 'buyers' market', and can demand a lot"**

**GEN JOSÉ AUGUSTO CREPALDI AFFONSO**  
Commander, Brazilian air force



cated by the air force's industrial co-ordination and development institute (IFT) was handed to the bidders, and many of these Brazilian companies ended up signing agreements simultaneously with Boeing, Dassault and Saab prior to the Gripen's selection in December 2013. This way, the risk of the Brazilian supplier selection lay exclusively with the bidder. The number and cost of man hours would be decided by Saab and Brazilian industry before the final fighter type was selected.

Once the final proposals were submitted, the air force recalled Brazilian industry executives to assist in the technical evaluation of the three proposals.

## EMBRAER'S ROLE

Embraer will be Saab's main partner in Brazil for the Gripen NG programme. Being responsible for the Brazilian aircraft's software is the great discriminator in this programme from the Brazilian perspective. The non-recurring costs are being shouldered by the air force, which gives the government the rights to





Selected in December 2013, the Gripen NG will provide Brazil's future F-X2 fighter capability under the local designation F-39

receive royalties from export sales.

The agreement between both companies is "95% complete", says Crepaldi. Embraer's involvement will focus primarily on development and integration, with only a small number of components being allocated to Embraer. "It's been five years since the talks began between the two companies and the technology capabilities scenario has changed considerably since then," says Crepaldi.

Since the Gripen was selected, there have already been three meetings to work out the contractual details, and three other gatherings purely to discuss the offset programmes with the Brazilian industry. Crepaldi describes the current air force missions as "first, to maintain sovereignty of Brazilian airspace, and second, to support the local [aerospace/defence] industry".

In these negotiations it was understood that if the air force decided upon a high local content in its fighters from the beginning, this would mean having to accept a later introduction date of the first Gripen NG. In order to

balance the two missions, it was decided to build the first Brazilian aircraft in Sweden but with a considerable presence and participation of Brazilian engineers and technicians.

#### MANUFACTURING CAPABILITY

São Bernardo Tecnologia Aeroespacial (SBTA) is a new Brazilian company focused in the manufacture of major subassembly blocks, being set up as a Brazilian Saab subsidiary. Neither Dassault nor Boeing offered to create something of the sort in the country. With SBTA as part of its proposal, Saab was able to offer that 80% of the Gripen NG's structural components would end up being made in Brazil.

Although Saab's ownership share of SBTA is still under discussion with local partner Inbra, the Swedish company has confirmed that it is committed to investing up to \$150 million in SBTA to create a world-class tier one manufacturing facility and that it expects all contracts and annexes pertaining to this Brazilian contract to be signed "during 2015".

Saab's existing Linköping plant will act as a potential back-up for any Brazilian-manufactured components, supplying both the Brazilian and Swedish Gripen production lines. Crepaldi says the air force observes these discussions from the sidelines, just making sure the 80% promise is kept. Sweden and Brazil's industrial sectors are expected to arrive at a satisfactory business conclusion just by themselves.

On the other hand, "there is no possible Brazilian radar factory with only a 36-unit order", says Crepaldi. This is one of the cases where the transfer of technology will revolve around an enhanced local maintenance and post-sale support service availability. Embraer and AEL will be involved in the electronic warfare area.

On the engine side, there was the possibility of using the new enhanced performance/durability variants of the GE F414, but since these new versions would impose more non-recurring costs on the air force, it was decided to stick to the tried and tested F414G »

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» because it already allows the Gripen NG to achieve its required performance level.

GE Engines' recent acquisition of Italy's Avio brought back into the US company's portfolio the previously spun-out fighter engine maintenance business in Brazil. Crepaldi has said that all this "turbulence" has not influenced in any way the F414 support package offered by GE in the Saab F-X2 proposal. From 2021 on, GE will be doing up to third-level maintenance of these engines locally in Brazil. The air force will also be involved in engine maintenance and will take part in studies regarding jet engine design.

The São Paulo Aeronautical Maintenance Depot, which handles Northrop F-5E/F maintenance for the air force, will also be tasked with the Gripen NG work. Unlike its predecessor, which had to be delivered by truck, the Gripen will be able to fly into nearby Campo de Marte regional airport, postponing the air force's plans to close it down. All air force functional commands are currently writing the procedure manuals needed to put the Gripen in operational service in Brazil.

#### CERTIFICATION AND EXPORTS

Both air forces have teamed up to certificate the new aircraft jointly. IFI and its Swedish equivalent, the Swedish Military Aviation Safety Inspectorate, have met to develop a certification process that would be satisfactory to both countries. The Gripen NG is to undergo three levels of certification: initial, operational and final certification.

To be able to export Gripen fighters from Brazil is a declared ambition of the Brazilian government. It sees military fleet modernisation as a necessary step for the local industry to be able to achieve more high value-added technology exports. The undisclosed unit cost for the Brazilian-configured Gripen NGs is already frozen but the export price for these aircraft will have to be determined between Saab and Embraer.

The total number of Brazilian jobs created by the Gripen NG programme is forecast to range between 4,000 and 5,000. All published numbers and percentages are being reviewed by the PwC consultancy firm and will use the Brazilian Development Bank's standard reporting methodology.

According to Saab: "Brazil and Brazilian industry will benefit from a new capability to design, develop, produce and export supersonic fighters to the world market together with Saab. This creates a possibility for Brazil to broaden its industrial base and capability. By forming strong mutually beneficial partnerships with several Brazilian companies, new jobs will be created."

"All of the General Air Command performance required parameters were met by the



The Brazilian government has declared its intention to export the type

configuration offered by Saab", says Crepaldi.

In the Brazilian air force, the organisation responsible for establishing the requirements for new aircraft programmes is the air staff. Nothing changes in the requirements – not even the paint scheme – without a decision by the air staff.

Despite the air force operating a limited number of ageing fighter types and not participating in recent air combat, Crepaldi says this does not hamper the force's ability to be able to know how to set up up-to-date requirements for supersonic fighters.

This knowledge has arrived through extensive international co-operation and interchange programmes such as Cruzex exercise, through which the air force is exposed to new doctrines and concepts. The Embraer-developed F-5EM upgrade programme is an example, as well as introduced modern radars, beyond-visual-range combat and digital datalinks.

Air force generals were pleased when they realised that the 2008-issued new National Defence Strategy's understanding of how future defence programmes should be run was exactly the same as the previously written plans and requirements for F-X2. No changes were needed. In the strategy there were two full pages dedicated to the F-X2 programme.

#### **"All the General Air Command required parameters were met by Saab's configuration"**

**GEN JOSÉ AUGUSTO CREPALDI AFFONSO**  
Commander, Brazilian air force

The two main goals preserved were the intention to focus on both the operational needs as well as those of the national defence industry. The 1,800-page contract was finally signed on 24 October 2014. Another 2,500-page contract was signed just to cover the offset agreements. Every single aspect of this

agreement is covered in detail in these contracts, so there is no doubt on what all the participants in its implementations will have to do when the due time comes. The final configuration and supplier list for the Gripen NG is still not closed.

The contract comes into effect once a number of pending issues such as the foreign financing and Senate approval are finally settled. This is expected to happen around mid-2015 with the preliminary design review set to start 20 months from that date.

Twelve months after the PDR there will be a critical design review, the point in the process where the design is completely frozen. Some things being set already, the new Gripen will not sport diverterless supersonic inlets, maintaining the current intake design.

#### PROGRESS MONITORING

During a breakfast meeting with local media in March, the new commander of the Brazilian air force announced that the Gripen NG is to be called the F-39 by the service. According to Crepaldi, Brazilian and Swedish Gripen NGs are considered to be "the same product, but with variant configurations". He points out that Brazil was at the top of the list of potential Gripen NG clients when the model was born, answering the air force's requirements.

The Brazilian-Swedish relationship is "great" according to Crepaldi, but there is no intention to create a special bilateral organisation (such as Europe's OCCAR) to manage this programme. However, the Brazilian air force will set up a control and progress monitoring group in Sweden, as is normal in every acquisition programme, to make sure the Gripen NG contract is evolving exactly as contracted.

The first Brazilians from industry are to arrive in Linköping by mid-2015. In total, over 300 engineers from seven Brazilian companies will participate in the technology transfer programme, running in batches until 2020. ■



A single prototype was funded by the government in 2009

# OUT OF NOVAER

With the Neiva T-25 more than 40 years old, the Brazilian air force urgently needs to replace its training aircraft – and start-up Novaer has seen the opportunity for its T-Xc

**FELIPE SALLES** RIO DE JANEIRO

**P**rivately-owned Novaer Craft's 30-odd employees temporarily operate from rented offices in a rather run-down office park positioned at the very edge of the São José dos Campos aerodrome.

The location – adjacent to Embraer headquarters – is appropriate. Founded and managed by ex-Embraer employees, Novaer trusts that its new side-by-side, twin-seat, aerobatic basic trainer design – dubbed T-Xc (for trainer, future, carbonfibre) – has what it takes to replace the 100-plus Neiva Universal 40-year-old trainers still used in the Brazilian air force academy.

If Novaer's plans succeed, the military T-Xc trainer and a civil variant dubbed the U-Xc could turn the company into Brazil's second

indigenous aircraft manufacturer after Embraer – but only if it passes through the gauntlet of economic and operational challenges facing any aviation start-up.

The internal Brazilian civilian and military markets have a history of instability, but Novaer president Graciliano Campos remains confident the T-Xc is crafted to survive. "We believe we have a market-oriented vision, this is why our first plane is [from scratch] a dual-purpose platform. Besides that, the conditions in both markets and the available technologies are substantially different today than they were in the recent past."

Privately financing a new military trainer is an exception to the market rule, which Campos acknowledges. "It is always up to the entrepreneur to face the market's risks," he says. "But in the end an air force that is preparing to adopt revolutionary new aircraft

such as the [Saab] Gripen NG and the [Embraer] KC-390 must be thinking of using a modern training system that is compatible with the technology level of these 21st century aircraft."

Veteran Embraer engineer Luiz Paulo Junqueira started Novaer in 1998 as a standalone aeronautical engineering services provider, having won a contract from Embraer for the development of the original Tucano trainer's landing gear. This is a segment that is still relevant to the company, with the Tucano fleet now undergoing mid-life updates in several countries.

Novaer was then involved in a number of foreign programmes, assisting in the development of the Eviation Jets EV-20 and US Aircraft's A-67 Dragon. Ten years later, management decided to make Novaer into a more traditional and integrated aeronautic company by purchasing the rights to the existing wooden K-51 tandem seat-equipped aerobatic prototype developed independently by engineer Jozséf Kovács.

## DIMENSIONS

Novaer, with Kovács now on board, proceeded to convert the K-51 to side-by-side seating and with carbonfibre construction, a new production-ready model to address both the military and general aviation markets. Despite these changes, the surface size and external dimensions are identical between both aircraft.

The detailed development and the construction of a single prototype was funded in 2009



by a reais (R) 10 million (\$3 million) grant from the Brazilian government research and project development fund, FINEP. To date, around R30 million has been invested in this programme, and another R30 million will be needed to implement the new 400-employee factory in Santa Catarina state.

In 2013, SCPAr, the state's holding for development, sealed this choice of location by buying a minority stake in Novaer. That state's government investment is closely related to its decision to create a new aerospace and defence industry hub there. The new factory is scheduled to open in 2018 and is contingent on Novaer having the funds needed to complete the U-Xc civilian certification process.

The full certification of T-Xc is funded by the FINEP grant and will be carried out in partnership with CTA, the Brazilian air force's Technology Command also located in São José dos Campos. There will be both a military (CTA) and a civilian (ANAC) certification for this aircraft, expected for the end of 2017. Says Campos: "We can guarantee that [the production model's] cost won't be more than its competitors in the same market category".

The use of sturdier composite structures promises that the T-Xc will have a much longer service life than the aluminium Neiva T-25s.

## OPPORTUNITY

The T-25's shortcomings today are mostly connected to its analogue avionics and a low power-to-weight ratio, which implies a low climb-rate that, in turn, limits the number of training sorties. It is a robust and reliable aircraft, but a more modern platform can make the pilot training operation much more efficient. However, the Brazilian air force has yet to issue a set of technical specifications for a T-25 replacement.

To improve its market opportunity, Novaer plans to simultaneously offer a five-seat civilian utility derivative, referred to in-house as the U-Xc. The structure will be the same for both the T-Xc and U-Xc. The only difference would be the cockpit seat and display configuration. If an air force wishes to equip their trainer with lightweight ejection seats, like the Martin Baker Mk0/Mk10, a punch-through clear bubble canopy will need to be installed in place of the standard "gullwing" installation. Both companies signed a memorandum of understanding at the 2012 FIDAE show in Chile.

Two prototypes are currently planned. One will be dedicated to flight testing and the other will be used for static ground testing. The second prototype will be completed in the U-Xc configuration, and first production aircraft deliveries are expected for the start of 2018.

The first prototype's maiden flight took



**Novaer sees a market for the type's civil variant as a replacement for air club trainers**

place in August 2014 and so far the flights have proven the aircraft to be better than expected. After 18 flight tests and 15 flight hours, minor problems have been fixed, such as the repositioning of the pitot tubes and a new engine oil cooling exhaust. Sales activity and the taking of orders is due to start after final certification.

"We are currently in the process of planning our sales and post-sales structure outside of Brazil, especially in the US market that we expect will take the lion's share of our production," Campos says.

He adds that early contact with the giant state-owned Brazilian National Economic and Social Development Bank indicates there will be funds available for the export of Brazilian-developed aircraft to export markets.

Campos says Novaer "understands that transfer of technology programmes are a common requirement and we are ready to discuss very attractive programmes with any interested prospective buyers".

The U-Xc has structural attachment points for the integration of ballistic recovery parachutes that are attractive to the civilian

market but not the military market.

Another opportunity identified in Brazil by Novaer is the replacement of some 400 obsolescent air club basic trainers.

Currently, the type's construction is to happen completely in Brazil – as well as all the engineering, design and development work. In the end, this adds up to about 60% Brazilian content because avionics, engines and propellers will be imports. The aeronautic grade carbonfibre fabric used in the airframe will also be imported.

In terms of powerplant, the Brazilian air force has long experience with Lycoming engines, which were also used on the veteran T-25 trainer. Besides that, Brazilian general aviation is likely to grow in the near future. Nonetheless, the T-Xc design has allowed for a turboprop-powered variant both as a trainer and as a general aviation type, demanding minimal modification beyond the shape and contour of the engine cowlings.

## CO-OPERATION

Although it has no plans to purchase it, Brazil has been a key participant in Unasur-1, a regional trainer project headed by Argentina's FADAE. This tandem-seat turboprop is being aimed at replacing the original Embraer Tucano. Novaer has been invited by the Brazilian government to be a part of this project, where it would design and supply its landing gears and the hydraulic systems.

An AMX programme veteran, Campos says, "I'm a fan of co-operative programmes – smaller companies like ours need to partner up to succeed. You can't fear competition. The end benefits will always be greater. We've even noticed that just by participating in this regional programme, the interest about Novaer amongst the press, manufacturers and suppliers in South America has grown.

"This opportunity may lead us to develop new partnerships with foreign suppliers." ■



**First deliveries are expected in early 2018**

## KERRY REALS LONDON

As the world becomes more connected than ever, access to wi-fi is increasingly seen as an important resource in many people's lives. More and more airline passengers are expecting not to have to remain incommunicado during their time on board an aircraft.

This year will see the launch of Inmarsat's widely anticipated Ka-band satellite-based global broadband service, GX Aviation, following the successful deployment of the second satellite in the constellation in early February. Meanwhile, the launch date for the satellite operator's pan-European hybrid air-to-ground/S-band in-flight internet service is targeted for 2016.

These are exciting times in this rapidly evolving market, which presents both opportunities and challenges to airlines as they grapple with the challenge to meet growing demand for connectivity while ensuring their hefty investments pay dividends.

Inmarsat, which aims to launch its GX service early in the second half of this year, describes the high-speed offering as "the fastest broadband in the skies". A network of three satellites will provide seamless global coverage, meaning that "as you fly across the time zones, your passengers will have a continuous, consistent service as traffic is handed seamlessly across each spot beam, and from one satellite to another", says the company.

## LAUNCH

Vietnam Airlines last September became the first airline to sign up for GX Aviation when it selected US-based connectivity provider Gogo to install and operate the service across the majority of its ordered Airbus A350s and Boeing 787s, the first examples of which are due to be handed over to the carrier this year. Inmarsat Aviation president Leo Mondale says that more airline customers will be announced "very soon".

Mondale says there has been an "explosion in demand" for in-flight connectivity, "from the cockpit to the cabin and everywhere in between", but he believes the biggest opportunities for making best use of it will be in the cabin.

"The in-flight connectivity market is only going to grow. While there will be growth in demand to supply connectivity for communications to the cockpit for enhanced safety and aircraft management, we see the real opportunity is in the cabin," says Mondale. "Passengers expect to be able to connect in the air as they do on the ground."

"The opportunities in the cabin include passenger communications, for example, and connected crew tablets, as well as inventory management, crew rostering, credit card payments and telemedicine."



# STAYING IN TOUCH

As Inmarsat's global broadband service nears its launch in a competitive market, airlines across the world are readier than ever to invest in onboard online provision



US carrier JetBlue Airways provides connectivity to passengers through a ViaSat Exede Ka-band satellite service



British Airways is in talks with Inmarsat



Vietnam Airlines was the first to install GX Aviation

## “Europe will rapidly become a significant market for in-flight connectivity”

**LEO MONDALE**

President, Inmarsat Aviation

In the USA, the market for in-flight connectivity has taken off much faster than in Europe and passengers there are widely accustomed to staying connected in the air via satellite-based or air-to-ground systems. But Europe is catching up fast and will soon have its own hybrid air-to-ground/satellite-based network, courtesy of Inmarsat.

The satellite operator last June announced plans to deploy an EU-wide integrated aviation connectivity network and said it was in “advanced discussions” with British Airways to be a launch customer. Mondale says the company “is in discussions with a number of airlines, as well as continuing our negotiations with BA”.

Inmarsat recently announced that it had partnered with Alcatel-Lucent to develop the ground infrastructure component of the network. On the satellite side, the company is working with EU member states to obtain the necessary permits to enable it to use the S-band satellite, known as Europasat, for its hybrid aviation network.

“We already have authorisations from 23 member states and are progressing well to meet our target to launch the network in 2016,” says Mondale.

“Our projections are that Europe will rapidly become a significant market for in-flight connectivity so will require a lot of capacity,” he adds, noting that Inmarsat’s hybrid solution is well positioned to meet that demand. “The real advantage sits in the fact that the satellite and

air-to-ground links complement each other, providing the high level of capacity required over the high-density traffic routes of Europe.

“Because we manage all aspects of the network, we can provide consistently high-quality service, whether using the EU aviation network over the EU or swapping seamlessly on to GX for intercontinental flights.”

### REGIONAL

It is not just network airlines that have signed up to or expressed an interest in offering in-flight wi-fi. In the USA, JetBlue Airways and Southwest Airlines both provide connectivity to their passengers, through a ViaSat Exede Ka-band satellite service and Global Eagle’s Row 44 Ku-band product, respectively.

In Europe, Oslo-based budget carrier Norwegian Air Shuttle uses the Row 44 platform to offer free in-flight wi-fi to its short-haul passengers, while Spanish low-cost operator Vueling recently signed up with Thales unit LiveTV to offer Ka-band connectivity via Eutelsat.

Meanwhile, low-cost giants EasyJet and Ryanair appear to be waiting in the wings with a view to introducing in-flight wi-fi when the costs come down. EasyJet chief executive Carolyn McCall said during the carrier’s full-year financial results conference in November that in-flight wi-fi “is not an area necessarily to be a first-mover on, but when it becomes a lot more mass-available at the right price and... when it is of better quality then I think all of us will have it”.

Similarly, Ryanair is keen to introduce in-flight wi-fi as soon as it becomes less cost-prohibitive. Ryanair chief technology officer John Hurley says the Irish budget carrier is looking “big time” at offering wi-fi, but that this will depend on the implementation and running costs of these systems coming down. To install a satellite-based onboard connectivity system, aircraft must be retrofitted with antennas, which Hurley says create an extra “1-2% drag”.

Hurley says the pan-European hybrid satellite-based/ATG service being developed by Inmarsat is “one possibility” for the airline.

If and when Ryanair introduces in-flight wi-fi, it is likely to be offered on flights with a stage length of two to three hours, because “on a 30min hop from Dublin to Liverpool, there would be no point”, says Hurley.

As far as pricing goes, the Ryanair CTO says he is “not fully sure” whether the carrier would charge passengers for the service. “We have to work out the cost to fit our aircraft out,” he says, adding that one possibility would be to follow JetBlue Airways’ example of offering certain basic services – such as email and other light internet platforms – for free and charging for more bandwidth-heavy services.

Ryanair could take a leaf out of Vueling’s book and find a partner that will provide in-flight connectivity at no charge. The Barcelona-based carrier last year signed such an agreement with Spanish telecommunications company Telefonica, satellite operator Eutelsat and Thales unit LiveTV. Hurley says the Irish carrier is “in talks” with some of the same partners.

In the meantime, Ryanair will soon begin trialling a free-to-access wireless in-flight entertainment service that will stream content from an onboard server to passengers’ own electronic devices.

The airline will offer passengers on certain flights the opportunity to stream TV shows and films to their own smartphones, tablets and laptops this summer. If the trial proves successful, the service “will be rolled out later in the year”, says Hurley.

As many airlines are discovering, the eventual widespread introduction of in-flight wi-fi appears to be a foregone conclusion. As Ryanair’s Hurley puts it: “The reality is that the world is going wi-fi. It’s becoming as important as running water for most people.” ■

# DIFFERENT CLASS

As the front of the airliner moves upmarket, airlines are lifting their premium offerings to new heights of luxury – or abandoning first-class cabins entirely

KERRY REALS LONDON

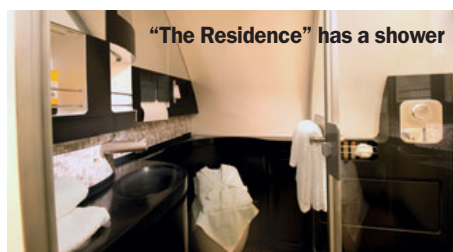
As business-class cabins become ever more luxurious, airlines find themselves at a fork in the road when it comes to deciding their future strategies for premium passengers.

They can either eliminate first class cabins from their premium offerings, choosing instead to equip their business-class cabins with all the bells and whistles once associated with first, or they can continue to offer first class but on a significantly grander and more opulent scale than before.

“Business-class cabins have the fastest evolution compared with all the other types of cabins,” says Zodiac Seats vice-president marketing and product strategy Laurent Stritter. “This means two options for first-class cabins: either a significant upgrade in the future; or [replacing] first class with an even more sophisticated business class. This will require of the seat manufacturers even more innovation.”

Responding to this evolving market, Zodiac last year unveiled its Halo first-class suite concept, which Stritter says provides “a glimpse of what can be expected in the first-class cabins of tomorrow, at least for the airlines that will keep going in this segment”.

Halo, which was nominated for a Crystal Cabin Award last year, showcases a number of innovations that could be used to put together a private first-class suite on an aircraft in the future. Design company Yellow Window, which has been helping Zodiac position the



“The Residence” has a shower

concept, says its “discrete technologies” allow passengers to adapt the space according to their changing needs.

“During the course of the flight, the environment can be configured to fit activities such as dining, work, leisure or rest,” says Yellow Window. “For the passenger there is no compromise: there is the possibility of intimacy of isolation, of inviting up to four persons into his/her suite, and of the comfort of a bed and bathroom typical of a luxury hotel.”

The Halo concept emphasises “the experiences most often restricted while on board” – such as sense of space, flexibility and freedom, Yellow Window says.

## RESIDENCE

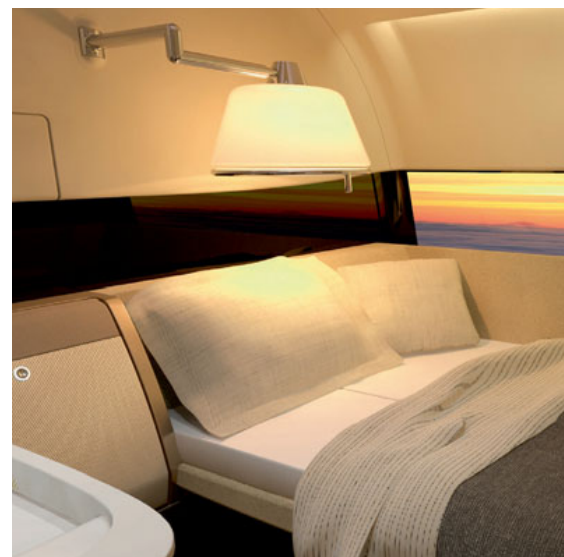
Stritter believes Zodiac is now well-equipped to address “all sub-segments of first class, from the business/first high-quality product, Fusio, to the very high-end concept, Halo, and high-end mini-suites, Venus”.

An alternative, more radical position is taken by Mark Hiller, chief executive of German manufacturer Recaro Aircraft Seating, who believes that first class as we know it will eventually be consigned to the history books.

“Traditional first class will disappear, or it will become a very special product,” says Hiller, pointing to the high-end premium offering unveiled last year by Etihad Airways as evidence of this trend. The Gulf carrier’s top-of-the-range product, “The Residence”, is an 11.6m<sup>2</sup> (125ft<sup>2</sup>) three-room suite located on the upper deck of its Airbus A380s. It features a private living room, a separate en-suite



The Recaro seat converts into a fully-flat bed



shower room and a bedroom with a double bed – accompanied by a price tag nearing the cost of hiring a private jet.

The suite contains a 32in (81cm) LCD monitor in the living room plus an additional 24in screen in the bedroom, and passengers are waited on throughout the flight by their own personal butler. It can be booked for either single or double occupancy.

For first-class passengers with slightly thinner wallets, Etihad’s A380s and Boeing 787s also offer “apartments”, each featuring an armchair and an ottoman that converts into an 81in bed. By offering its highest-paying passengers their own private bathroom, Etihad’s Residence suite goes one step beyond

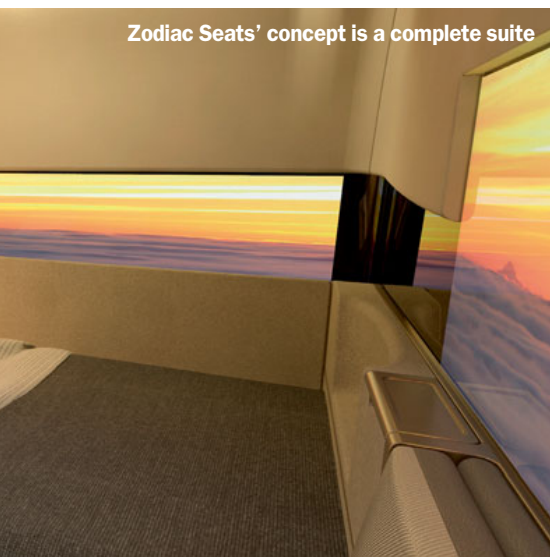


Etihad’s A380s offer first-class “apartments”





Recaro



Zodiac Aerospace



Etihad



Zodiac Aerospace

rival Emirates' first class product, which offers passengers shared use of two onboard "shower spas".

Qatar Airways, meanwhile, offers "the widest first-class seat in the industry", according to chief executive Akbar Al-Baker. But rather than being enclosed in its own private suite, the seat features screens either side, which can be raised or lowered. A seat control activates an in-seat massage function.

Air France has also started offering first class suites on Boeing 777-300 flights from Paris Charles de Gaulle to Singapore, Jakarta and Dubai. The carrier's "La Première" product is separated from the rest of the cabin by a thick curtain, and features a seat that converts

into a fully-flat bed complete with a mattress installed by flight attendants when required.

The first aircraft featuring La Première took off for Singapore and Jakarta in January, and the product was then deployed on Dubai flights in February, ahead of roll-out on services to New York, Libreville in Gabon and Yaoundé in Cameroon later this year. In addition to first class, the cabins on these aircraft will also include business, premium-economy and economy-class seating.

#### PARAMOUNT

For airlines that follow the alternative path and allow intercontinental first class to fall by the wayside in favour of an improved business class – examples include Air New Zealand and Delta Air Lines – weight savings and higher-density seating options are paramount, according to Hiller.

"Weight is very important with the disappearance of first class because business class cabins are larger than in the past, so there are more seats," he says. The ability to expand or

contract the size of the business-class cabin to match demand is increasingly attractive to airlines and for this to happen, "it is important that the seat is as light as possible", Hiller says.

Weighing in at around 80kg (176lb) "depending on the exact configuration", Recaro's CL6710 long-range business-class seat – which it launched at last year's Aircraft Interiors Expo in Hamburg – is "at least one of the lightest long-range business-class seats on the market", says Hiller. Competing products are "up to 15-20kg heavier", he adds.

The CL6710, described by Recaro as providing a "hotel feeling in the sky", has a pitch of 46in and converts to a fully-flat bed measuring 82in. The manufacturer calls the seat a "win-win situation for passengers who enjoy maximum living space, as well as for airlines [which] can use their cabins efficiently".

With two schools of thought coexisting on the definition of first class, it will be left to premium passengers to vote with their wallets to show which version they prefer and which has the most promising future. ■

From yuckspeak to tales of yore, send your offcuts to [murdo.morrison@flightglobal.com](mailto:murdo.morrison@flightglobal.com)

## Spitfire: pride of Birmingham

The two iconic RAF fighters of the Battle of Britain have pride of place in a new exhibit at Thinktank, Birmingham's science museum.

The display features a Supermarine Spitfire Mk IX and Hawker Hurricane Mk IV suspended from the ceiling, and marks the types' legacy to England's second city.

More than half of all Spitfires were manufactured in Birmingham's Castle Bromwich district during the war, as well as parts for the Hurricane.

## Fleet-footed

Nice line from Etihad boss James Hogan at the Aviation Club in London. Talking about the Abu Dhabi airline showing its commitment to Heathrow by putting three A380s onto the route, he quipped: "You could say I'm voting with my fleet."

## Rebels without the flaws

"The Defence Secretary has announced that the UK will provide further support to the international coalition's efforts to counter the ISIL terrorist network by providing military training to Syrian moderate opposition forces," reads a press release.

"Moderate opposition



"I've been in a few tight spots, but this..."

forces?" asks our scribe in the flak jacket. "Good job they're not the rubbish ones. And if they were really good opposition forces, presumably they wouldn't need training."

## Flight Cruise

One of the highlights of the upcoming *Mission: Impossible – Rogue Nation* is Tom Cruise taking to the air clinging to the side of an Airbus A400M, a stunt the Hollywood star performed for real (albeit strapped firmly on). You can see the trailer on YouTube.

Notes our scribe in the flak jacket, who has endured several butt-achingly long-haul trips in the back of troop transports: "He should try the seats inside instead... way comfy!"

## Purrfect landing

Maurice Swallow liked our cover shot of the Boeing 777 in our 17-23 March issue (left). But how, he asks, did the cat manage to get into the nose wheel bay (look closely)?

## ETOPS that

Rod Holdridge enquires about the FAA's approval of a 330min ETOPS for Boeing's 21st-century jumbo: "Does this mean Boeing's answer to the possible A380neo will be the 747-8lto (twin-engine option)?"



The naked truth

## Just your seat

Herb Kelleher's Southwest Airlines famously pioneered low-cost flying with the only frill a trademark bag of nuts – you were "flying for peanuts".

These days the budget sector's marketing ranges from pitching to the discerning business traveller (EasyJet) to "we're still cheap but not as nasty as we used to be" (Ryanair).

Back in the USA, unbundling is still the rage. Spirit's latest Bare Fare advertising (above) boasts "No 'free' bag, no 'free' drink. From the start, it's just your a\*\* + gas... and a personal item."

## Banging on

From the unfortunate choice of words files: a show daily at Malaysia's recent defence shindig in Langkawi ran with the opening day headline "LIMA show opens with a bang".

Two days earlier, four Indonesian pilots had ejected to safety over the site after a pair of KT-1 trainers collided in mid-air while rehearsing their aerobatic display.

## Busy with Lizzie

CW Graham put on a great exhibition with his 50hp

**100 YEARS AGO**

GW tractor biplane "Lizzie", making various stunts, such as

exceedingly sharp spirals and steep dives. To watch him it did not seem possible it was only a short time ago that he taught himself to fly.

## Day of the dogfight

Wednesday last marked a day of considerable air activity

**75 YEARS AGO**

over the Maginot Line and Western Germany.

British fighters

accounted for no fewer than five Messerschmitt Me 109s. It is thought that a Dornier and another Messerschmitt were also shot down.

## Enticing offers

It is reported from Buenos Aires that BAC and Douglas

**50 YEARS AGO**

Aircraft have offered Argentina military aircraft at low cost as

inducements to Aerolineas Argentinas to buy either the VC10 or the DC-8 respectively as replacements for the airline's Comets. The aircraft offered by BAC are said to be Canberras and those by Douglas A-4D Skyhawks.

## Mars solar stake

Project Nina, Britain's entry in the proposed Columbus

**25 YEARS AGO**

500 Space Sail Cup, an international race to the planet Mars

between solar-powered spacecraft, will require at least \$10 million funding, says spacecraft designer Cambridge Consultants.



**100-YEAR ARCHIVE**

Every issue of *Flight* from 1909 onwards can be viewed online at [flightglobal.com/archive](http://flightglobal.com/archive)



Made it by a whisker



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### Dangers of not knowing the drill

As David Learmont describes in his article (*Flight International*, 17-23 March), the ISAE is testing pilots' brain function under increasing workloads and with different methods.

That's wonderful, but we have known for years that people under stress (like soldiers) increase muscle tension and reduce their cognitive functions. It is a very old survival mechanism, and all pilots know the effect of becoming more and more tense, getting tunnel vision and finally being completely frozen.

The less experience a pilot – or any person – has, the faster he or she will experience those sequential psychological and neurological effects. As a result soldiers are trained to function automatically – on their reflexes. This is called “drill”.

Pilots still have some drills left today, like putting their oxygen masks on at high altitudes. But what was necessary in the old days – for example a quick reaction to engine failure – is no longer practised today as a drill, and many pilots are not trained

#### TRAINING

### Don't overlook the modular path

It was encouraging to read in this year's Training Guide (*Flight International*, 17-23 March) that airlines are at last acknowledging the potential crewing problems they face.

But whilst the ab initio schemes David Learmont describes are invaluable, it remains the case that some airlines are unable or unwilling to commit to supporting potential trainees before they even start their training. The need for low-hours pilots cannot be met solely by the major integrated and MPL training providers – yet there is no mention of modular training, despite the considerable numbers of trainees who take this route to gain their CPL/IR.

We know modular students do not benefit from the same employment assistance as integrated students but, given additional training and airline support, the industry could benefit from this under-utilised source of crew. It could also potentially increase the numbers taking up training but who are currently debarred because of the extremely high cost of integrated courses.

Kura Aviation, supported by airlines including BA Cityflyer and Flybe, already deliver post CPL/IR training aimed at modular pilots, teaching the knowledge and skills required of a first officer whilst offering risk guarantees both to individuals and airlines. It is early days yet, but a 100% employment success record speaks for itself.

Let us not overlook the modular route as a training path for the airline pilots of the future.

**Mike Langley**

Kura Aviation, Stratford-upon-Avon, UK



Ab initio is not the only way to go

Ree Features

to maintain self control in unexpected situations.

The mental control techniques they need are well known, but are not part of pilot training – neither in the simulator nor the classroom. As I have repeatedly pointed out over the past two decades, pilots are often said to have “lacked situational awareness” in accident reports.

But no action has been taken by ICAO, the FAA or EASA, nor will you find any accident safety recommendation pointing towards mental training.

**Capt Awad Thomas Fakoussa**  
Mossautal, Germany

### Back in the frame

Carl Brancher (*Flight International*, 10-16 March) notes that language evolves. This is true, but – a “picture framer” makes frames around pictures. This makes sense. An “air framer” makes frames around air. A bit surreal. But an “airframer” makes “airframes” which are frames made of air, and that sounds crazy.

And the suffix “-er” does not need to be added to a verb, a noun will often do – an editor may be “as mad as a hatter”.

**Arthur Nilssen**  
Bergen, Norway

### Locked in or out?

I have always been uncomfortable with the concept of the armoured cockpit door – something that was largely imposed on the industry by the US following 9/11.

I felt it was a political response to a problem which had actually become obsolete before the sun had even set on that terrible day.

The logic is this. Prior to 9/11, the philosophy with respect to hijackings was for the pilots to stay calm and let the negotiators on the ground do their job.

Now that we are all aware there are people who hate us so much that they are prepared to kill themselves in order to bring a plane down, we should also be aware that this philosophy no longer works. No hijacker could now attempt to take a plane armed only with knives, as per 9/11 – the passengers would not allow it as occurred on Flight 93 on the day itself.

Since the armoured doors were enforced across the industry, we have had a number of crashes where, although not the cause, the locked and armoured door probably prevented the aircraft and its occupants from being saved.

I suspect the Helios crash was one of the first. In that case the crew were incapacitated and only in the last moments of the flight, just as the aircraft was about to run out of fuel, was any activity in the cockpit seen by a chase aircraft.

By all means have a lock on the door to the cockpit to prevent the odd rowdy passenger from bursting in – but all crew members should all have unhindered access.

**Andrew Lyons**  
By email



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## EDITORIAL, ADVERTISING, PRODUCTION & READER CONTACTS

### EDITORIAL +44 20 8652 3842

**Quadrant House, The Quadrant,  
Sutton, Surrey, SM2 5AS, UK**  
flight.international@flightglobal.com

**Editor** Murdo Morrison FRAeS  
+44 20 8652 4395 murdo.morrison@flightglobal.com  
**Head of Strategic Content/  
Flight Daily News Editor** Dominic Perry  
+44 20 8652 3206 dominic.perry@flightglobal.com  
**Managing Editor/Defence Editor** Craig Hoyle  
+44 20 8652 3834 craig.hoyle@flightglobal.com  
**Business Editor** Dan Thisdell  
+44 20 8652 4491 dan.thisdell@flightglobal.com  
**Operations/Safety Editor** David Learmount  
+44 20 8652 3845 david.learmount@flightglobal.com  
**Business & General Aviation Editor** Kate Sarsfield  
+44 20 8652 3885 kate.sarsfield@flightglobal.com  
**Aerospace and Defence Reporter** Beth Stevenson  
+44 20 8652 4382 beth.stevenson@flightglobal.com  
**Magazine Enquiries** Dawn Hartwell  
+44 20 8652 3315 dawn.hartwell@flightglobal.com

### AIR TRANSPORT TEAM

**Editor Flightglobal Premium News** Graham Dunn  
+44 20 8652 4995 graham.dunn@flightglobal.com  
**Managing Editor** Niall O'Keefe  
+44 20 8652 4007 niall.okeefe@flightglobal.com  
**Air Transport Editor** David Kaminski-Morrow  
+44 20 8652 3909 david.kaminski-morrow@flightglobal.com  
**Air Transport/MRO Reporter** Michael Gubisch  
+44 20 8652 8747 michael.gubisch@flightglobal.com  
**Senior Reporter** Oliver Clark  
+44 20 8652 8534 oliver.clark@flightglobal.com

### AMERICAS

**Americas Managing Editor** Stephen Trimble  
+1 703 836 8052 stephen.trimble@flightglobal.com  
**Deputy Americas Editor - Air Transport** Ghim-Lay Yeo  
+1 703 836 9474 ghimlay.yeo@flightglobal.com  
**Air Transport Reporter** Edward Russell  
+1 703 836 1897 edward.russell@flightglobal.com  
**Air Transport Reporter** Jon Hemmerdinger  
+1 703 836 3084 jon.hemmerdinger@flightglobal.com

### ASIA/PACIFIC

**Asia Editor** Greg Waldron  
+65 6780 4314 greg.waldron@flightglobal.com  
**Asia Air Transport Editor** Mavis Toh  
+65 6780 4309 mavis.toh@flightglobal.com  
**Asia Finance Editor** Ellis Taylor  
+65 6780 4307 ellis.taylor@flightglobal.com  
**Reporter** Aaron Chong  
+65 6780 4851 aaron.chong@flightglobal.com

### EUROPE/MIDDLE EAST

**Israel Correspondent** Arie Egozi  
**Russia Correspondent** Vladimir Karnozov

### FLIGHTGLOBAL.COM

**Editor** Stuart Clarke  
+44 20 8652 3835 stuart.clarke@flightglobal.com  
**Web co-ordinator** Rebecca Springate  
+44 20 8652 4641 rebecca.springate@flightglobal.com

### EDITORIAL PRODUCTION

**Head of Design & Production** Alexis Rendell  
**Global Chief Copy Editor** Lewis Harper  
**Chief Copy Editor, Europe** Dan Bloch  
**Layout Copy Editors** George Norton,  
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### DISPLAY ADVERTISEMENT SALES

**Quadrant House, The Quadrant,  
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**Sales Manager** Shawn Buck  
+44 20 8652 4998 shawn.buck@flightglobal.com  
**Key Account Manager** Grace Hewitt  
+44 20 8652 3469 grace.hewitt@flightglobal.com  
**Sales Support** Gillian Cumming  
+44 20 8652 8837 gillian.cumming@rbi.co.uk

### NORTH & SOUTH AMERICA

**Vice-President, North & South America**  
Rob Hancock +1 703 836 7444  
robert.hancock@flightglobal.com  
**Regional Sales Director**  
Warren McEwan +1 703 836 3719  
warren.mcewan@flightglobal.com  
**Sales Executive** Kaye Woody  
+1 703 836 7445 kaye.woody@flightglobal.com  
Reed Business Information, 333 N. Fairfax Street,  
Suite 301, Alexandria, VA 22314, USA

### ITALY

**Sales Manager** Riccardo Laureri  
+39 (02) 236 2500 media@laurerassociates.it  
Laureri Associates SRL, Via Vallazze 43,  
20131 Milano, Italy

### ISRAEL

**Sales Executive** Asa Talbar +972 77 562 1900  
Fax: +972 77 562 1903 talbar@talbar.co.il  
Talbar Media, 41 HaGiva'a St, PO Box 3184, Givat  
Ada 37808, Israel

### ASIA/AUSTRALASIA

**Key Account Manager** Jay Ee  
+65 6780 4301 jay.ee@flightglobal.com  
Fax: +65 6789 7575  
1 Changi Business Park Crescent,  
#06-01 Plaza 8 @ CBP, Singapore 486025

### RUSSIA & CIS

**Director** Arkady Komarov  
komarov@worldbusinessmedia.ru  
Tel/Fax: +7 (495) 987 3800  
World Business Media, Leninskoy Prospekt, 80,  
Korpus G, Office 807, Moscow 125190, Russia

### CLASSIFIED & RECRUITMENT

**Sales Manager** Sophie Wild  
sophie.wild@rbi.co.uk  
**Recruitment & Classified Key Account  
Executive** Katie Mann  
+44 20 8652 4900  
Recruitment.services@rbi.co.uk  
**Recruitment & Classified Sales Executive**  
Stuart Lee +44 20 8652 4900  
Classified.services@rbi.co.uk  
**Key Account Manager - Asia Jay Ee**  
+65 6780 4301

### ADVERTISEMENT PRODUCTION

**Production Manager** Sean Behan  
+44 20 8652 8232 sean.behan@rbi.co.uk  
**Production Manager Classified** Alan Blagrove  
+44 20 8652 4406 alan.blagrove@rbi.co.uk

### MARKETING

**Marketing Director** Justine Gillen  
+44 20 8652 8031 justine.gillen@flightglobal.com

### DATA TEAM

**Head of Data** Pete Webber  
+44 20 8564 6715  
peter.webber@flightglobal.com  
**Commercial Aviation** Steven Phipps  
+44 20 8564 6797  
steven.phipps@flightglobal.com  
**Defence & GA** John Maloney  
+44 20 8564 6704  
john.maloney@flightglobal.com

### PUBLISHING MANAGEMENT

**Chief Operating Officer**  
Philippa Edward  
**Executive Director Content**  
Max Kingsley-Jones  
max.kingsley-jones@flightglobal.com  
**Publisher** Stuart Burgess  
stuart.burgess@flightglobal.com

### READER SERVICES

#### Subscriptions

Jenny Smith  
Flight International  
Subscriptions, Reed Business Information,  
PO Box 302, Haywards Heath,  
West Sussex, RH16 3DH, UK



#### Subscription Enquiries

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## EVENTS

### 20-21 April

**ISR conference**  
Holiday Inn Regent's Park, London  
isrconference.com

### 20-23 April

**AeroDef Manufacturing**  
Hilton Anatole, Dallas  
aerodefevent.com

### 24 April

**Skytech**  
Business Design Centre, London  
skytechevent.com

### 29-30 April

**Loyalty@Freddie Awards**  
Atlanta, USA  
flightglobalevents.com/  
loyaltyfreddies2015

### 1-3 May

**Drones, Data X conference**  
Santa Cruz, California  
nua.io

### 4-7 May

**AUVSI's Unmanned Systems**  
Atlanta, USA  
auvshow.org

### 10-11 May

**Aviation Africa**  
Dubai, UAE  
aviationafrica.aero

### 13-14 May

**Ascend Asia: Finance Forum**  
Singapore  
flightglobalevents.com/ascendasia2015

### 17-20 May

**ALTA CCMA**  
Punta Cana, Dominican Republic  
alta.aero/ccma

### 19-21 May

**EBACE**  
Geneva, Switzerland  
ebace.aero/2015

### 26-28 May

**AP&M Europe**  
Olympia London, UK  
apmexpo.com

### 31 May - 3 June

**1st International Symposium on  
Sustainable Aviation (ISSA)**  
Istanbul, Turkey  
issasci.org

### 4-6 June

**France Air Expo**  
Lyon-Bron airport, France  
franceairexpo.com

### 15-21 June

**Paris Air Show**  
Le Bourget, Paris  
siae.fr

### 30 June

**Ascend Europe: Finance Forum**  
London  
flightglobalevents.com/  
ascendeurope2015

### 17-19 July

**Royal International Air Tattoo**  
RAF Fairford, Gloucestershire, UK  
airtattoo.com

### 18-20 September

**Midden-Zeeland airport fly-in**  
Arnhem, the Netherlands  
neeland-airport.nl



For a full list of events see  
**flightglobal.com/events**

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Ref: DACPM/156/2015/1477 Date: 25 March 2015

### Request for Proposal (RFP)

- Biman Bangladesh Airlines Ltd. invites Proposal/Offer for taking ACMI (Wet) lease of aircraft having capacity of minimum 300 seats for a period of three months. Airlines, Operators, Owners of Aircraft, Manufacturers and/or Leasing Companies having aircraft of its own or legally authorized by the owner may participate in the RFP complying with the terms & conditions given in the RFP Schedule. Basic requirements are mentioned below:

a. Name and address of the Lessor, Owner and Operator	To be mentioned by the bidder: a. Lessor: b. Owner: c. Operator:
b. Number and Type of Aircraft	<ul style="list-style-type: none"> <li>02 (Two) aircraft of any type depending on seat configuration</li> <li>Bidder may offer one or more aircraft</li> <li>[Biman reserves the right to reduce the number of aircraft]</li> </ul>
c. Year of Manufacturing	Aircraft <b>must</b> be manufactured on 1st October 1995 or later
d. MSN & Registration Number of the Aircraft	Bidder <b>must</b> provide MSN & Registration Number of the offered aircraft
e. Nature of lease	ACMI (Aircraft, Crew, Maintenance and Insurance)
f. Lease Term and commencement of lease	3 (three) months lease, commencing from early August 2015
g. Seat Configuration	Aircraft <b>must</b> have minimum of 300 seats in two class configuration
h. Operational Capability	Aircraft <b>must</b> be capable of flying direct between Dhaka and Jeddah without any load penalty taking into consideration of Passenger Weight & Baggage 120 Kg.
i. Owner's Authorization	If the bidder/lessor is not the owner of the aircraft, then owner's authorization for leasing the aircraft <b>must</b> be provided along with the Proposal/Offer.
j. Heavy Maintenance Check	Heavy Maintenance check or D-Check <b>must not fail</b> due in the offered aircraft during the lease term.
- Detailed information is available in the RFP Schedule. RFP Notice and Schedule may be viewed at Biman's web-site: [www.biman-airlines.com](http://www.biman-airlines.com).
- Proposals/Offer are to be submitted to General Manager (Corporate Planning), Biman Bangladesh Airlines Limited, Head Office, Balaka, Kurmitola, Dhaka-1229, Bangladesh latest by **1000 hours BST** (0400 hours UTC) on **16th April 2015** through Courier Service or e-mail to [dacpm156@bdbiman.com](mailto:dacpm156@bdbiman.com). Proposals/offers may also be submitted through courier service or dropped in the Tender Box placed in the office of General Manager (Corporate Planning). The Proposal(s)/Offer(s) will be opened on the same day immediately after the closing time in presence of the Bidder(s), if any. No Proposal/Offer will be accepted after the closing time and date.
- For further information or query, General Manager (Corporate Planning) may be contacted at Telephone: +880-2-8901600/Extension-2415, +880-2-8901697 (direct), Fax: +880-2-8901396, E-mail: [gmp@bdbiman.com](mailto:gmp@bdbiman.com) during the office hours.
- Biman Bangladesh Airlines Ltd. reserves the right to accept or reject any or all the Proposals/Offer at any time and/or stage without assigning any reason, whatsoever, and no claim will be entertained in this regard. Mohd.

Mohd. Abdur Rahman Faruky  
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### Personal Requirements:

- Tertiary Education (University degree) with a minimum of 10 years management experience and overall 20 years of airline/airports experience.
- Very good written and spoken English
- Strong leadership qualities and people skills
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### Job Requirements:

The Job will require knowledge and experience in the following areas:

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## WORK EXPERIENCE NATHANIEL BARRETT

# Let your dreams lift you higher

Briton Nathaniel Barrett is the director of operations for Florida-based Cirrus Aircraft training provider and air taxi company Lift Air. He says he has had a passion for flying for as long as he can remember

## Have you always been interested in aviation?

From the moment I could walk and talk, I knew I was destined for a career in the skies. I can't remember a period in my life where aviation wasn't at the foreground. My granddad began flying at 17 and later worked for Rolls-Royce and General Electric on various programmes, including Concorde and the GE90. From an early age, I was surrounded by aviation.

## How did you begin your career?

My true "career" began with Lift Air in the fourth quarter of 2013, but truthfully I've always been working in aviation. Whether it was listening in on meetings my granddad was having or being with him at the Farnborough air show, aviation has always been my life. I really cannot recall a period in my life where I wasn't reading up on the latest and greatest in aviation or out at Heathrow plane spotting.

## How did you get involved with Lift Air?

At the time I was working as an assistant manager at a hotel on Florida's east coast. I stumbled across a job posting for the director of operations at Lift Air. I immediately applied, interviewed via Skype, and gave my notice at the hotel. Exactly two weeks later, I began.

## You launched services last year with a handful of Cirrus SR20/22 piston singles. How is the business faring?

We had a "soft" launch in September/October of last year and



Barrett's favourite view is from the left seat of a Cirrus

really ramped up our marketing for the first quarter of this year. We are finding that it is very much a niche market. We are targeting customers who previously were chartering jets around the southeast who want a more economical option.

## What are the most challenging aspects of your job?

The most challenging aspect of my job is keeping the schedules straight. Running multiple companies certainly keeps me busy. On one side we have our Cirrus Air Taxi, on the other side we are still a Cirrus Training Centre

**"I really cannot recall a period in my life where I wasn't reading up on the latest and greatest in aviation"**

— offering everything from flight instruction and aircraft rentals to management and sales. It's always a challenge keeping everybody on the same page. We also have different software programmes for the air taxi and the

flight school. Ensuring that an aircraft going out on a charter can't be booked for training keeps me on my toes.

## What do you enjoy most?

I enjoy the view from my office the most. I sit in front of floor-to-ceiling windows facing runway 14/32 at KSRQ [Sarasota-Bradenton international airport]. It's absolutely breathtaking! I routinely draw inspiration from my office. There is only one other view that is better and that is the view from the left seat of a Cirrus.

## What does the future hold?

I'm hoping the future holds a great deal for me! I think Richard Branson said it the best: "If your dreams don't scare you, they are too small!" I'm going to set the bar high for myself. My position with Lift Air provides me with the flexibility to continue my education and finish my BSc in business management, while continuing to expand my aviation horizons. I hope to finish up my private pilot's licence and continue on to my instrument rating before returning to the UK and fulfilling my dream of working my way up to an executive position with British Airways. ■



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